THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

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Detroit, the Foundrymen's Convention City

The 30th Annual Convention of the American Foundrymen's Association to Be Held Jointly With the Institute of Metals Division at the Michigan State Fair Grounds in Detroit, Mich., September 27-October 1, 1926

Written for The Metal Industry by F. J. HUNTLEY, Detroit, Mich.

When representatives from almost everywhere begin to your through the portals of Detroit on September 27 for the 30th annual convention of the American Foundrymen's Association and also for the 20th annual Foundry Machine and Equipment Exhibit, together with the International Foundrymen's Congress, they are going to experience a thrill that will stay with them for a long time after the great gathering has come to a close.

It is expected that several thousand will be present. Headquarters and registration for the men will be at the Michigan State Fair grounds where the sessions are to be held and where also will be arranged the exhibit.

Headquarters for the ladies will be at the Book-Cadillac Hotel, downtown, one of the most beautiful entertainment places to be found anywhere in the middle west. Frequent buses will run from the Book-Cadillac to the State Fair grounds, a ride of perhaps 20 minutes, so no one need feel alarmed that he will be long or unnecessarily separated from the lady or ladies who accompany him. Every detail so far as entertainment and transportation is concerned has been so successfully worked out that the trip between the two points really will be a pleasure rather than just an ordinary experience.

Officers and members of the Detroit Foundrymen's Association have been laboring for weeks getting ready for this big event. They are not only "all set" to spend plenty of money to give everyone a good time, but they also are preparing to give their individual attention to the visitors who come from far and wide for almost a week's stay in a city that probably has made fully as much progress in the foundry industry within the last five or ten years as any other in the country.

THE FOUNDRY INDUSTRY IN DETROIT

It would not be displaying too much egotism to say that Detroit could not help but make progress in the foundry industry. For many years it has been one of the leading centers in the production of metals and metal parts.

COLISEUM, MICHIGAN STATE FAIR GROUNDS, DETROIT, MICH.

Long before the automobile industry gave the city such a push forward, Detroit had become known all over the United States and Canada as one of the leading centers in the production and use of brass and copper. Later aluminum and gray iron took their places in the ranks with these two old metal standbys.

There is no other city in the United States or Canada today that manufactures so many stoves as do the great plants in Detroit. Furthermore, it is doubtful if there are many cities in the country that can point to such a record for the consumption of non-ferrous metals of every description. Stoves made Detroit's iron foundries famous; the motor car industry has done the same so far as non-ferrous metals are concerned.

J. J. Boland, vice president of the Michigan Foundrymen s association said in a recent interview that since the foundrymen held their convention in Detroit fifteen years ago, greater advancements have been made in the industry than at any time through its entire history. The last five years, he declares, has been particularly noted for wonderful changes.

Until the last few years, he adds, the foundry industry was noted for hard, back breaking work and especially intense suffering during the hot periods of the summer. He brings out prominently the fact that these body racking conditions have been practically done away with. With the changes in factory construction, ventilation, etc., the foundry no longer is the inferno it used to be in the old days when most of the workmen came to their tasks on foot or in the street cars instead of in their own motor cars as a great many are doing in these days.

The old work of pounding sand by hand has disappeared from the many modern foundries. This is particularly true of the Detroit and Michigan foundries. It is no longer necessary for a workman in a modern foundry to be a salamander or a giant.

In the old days a foundry worker was a rough and ready chap, something after the fashion of the early lumbermen of the northwoods. With the coming of labor saving devices and comfortable working conditions the modern foundrymen now lives on just as high a plane as any other skilled worker.

These labor saving devices that have brought about such changes among the foundry workers have resulted in equally wonderful changes in production. The modern foundry today is turning out more per man than ever before in the history of the industry. But that is not all. Better castings are being made and furthermore they are more accurate and dependable.

It is possible these days to send a messenger with a pattern to almost any Detroit foundry, and have the casting made and delivered in an almost incredibly short time. This is the result of modern equipment, modern methods and highly trained foundry workers.

It is estimated that between 35,000 and 40,000 persons are given employment in the Michigan foundry industry. There is hardly a community of any size in the state that does not have a foundry of some kind.

Notwithstanding that so many foundries are in constant operation through Michigan, many tons of castings are received each day from Ohio and other out of state sections.

Michigan foundrymen at the present time are seeking some way to eliminate so far as possible the peaks and the valleys of production. In their efforts more thoroughly to stabilize the industry they hope to relieve themselves of the burden of carrying the costs of fluctuating production which at times has been thrown back on them through the shifting of the motor car market.

AUTOMOBILE COMPANY FOUNDRIES

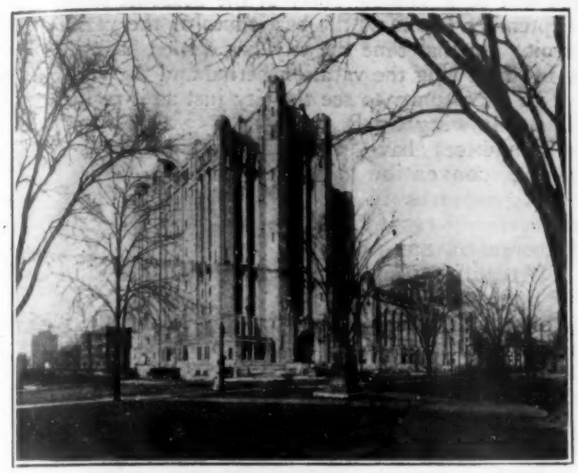
Before the motor car production became so stupendous, foundries throughout the state were largely connected with the stove and wagon manufacturing industries. Foundries at that time were what was then known as the converter and crucible types. But most of these have long since disappeared.

It is stated that when Henry Ford, R. E. Olds, Henry Leland and others, began to develop the motor car industry, the transition in foundry work began to make itself felt.

Much credit is given to Henry Leland of Detroit, former head of the Cadillac Motor Car plant, for putting the foundry industry in Detroit and Michigan on its present

INTERIOR OF AUDITORIUM

high standard of production. Mr. Leland came to Detroit in 1890 from New England where he had a long experience in the foundry industry. He found here, it is stated,



MASONIC TEMPLE, DETROIT, MICH.

the foundries were more or less crude and incapable of turning out the character of work desired. Trained engineers were none too many, the foundry industry being directed largely by skilled workmen but lacking in scientific training.

Mr. Leland's first experience in Michigan was in launch engines. The so-called "horseless carriages" made their appearance about this time and it was an easy matter for him to become attracted to them. Mr. Leland early gave sympathetic help to the engineers pioneering in the motor car field.

Max Enos, who has intimate knowledge of the big manufacturing industries in Detroit and vicinity says:

"Perfecting his work along scientific lines and striving for accuracy in measurements as well as accuracy in the mixture of metals, Mr. Leland was successful as one of the first molders of automobile castings.

"Production in quantity came when the Leland & Faulconer Foundry Company was absorbed by the Cadillac Motor Car Company. This was after 2,000 cylinder blocks had been cast for R. E. Olds."

The Ford Industries, a house organ for distribution among Ford workers, has the following to say regarding its foundry:

"The Rouge plant is the largest in the world. It covers more than 30 acres and pours 2,000 tons of castings every twenty-four hours. In addition to being the largest in size, equipment and number of men employed, it also leads the world in the production of small castings.

"The layout of the foundry has been pronounced to be one of the finest examples of plant design of the age. It is as completely mechanicalized as has been possible to make it.

"Maximum efficiency and minimum waste motion are apparent to even an untrained observer. Little heavy physical work is required, machines and conveyors taking the burden of the heavy toil from the muscles of the foundrymen. The conveyor system reaches a high point of perfection as everything is done 'on the move' from core making to pouring, and from the moment the molten metal flows from the ladle until it leaves the factory as a machine casting not once is its progress halted.

"The Rouge foundry, unlike most others, is not segregated into various departments. Instead, every department is coordinated into a continuous system of manufacture by the use of conveyors.

"Core making takes place in an endless chain which feeds the big conveyors carrying the molds to the pouring stations. A special type of pendulum conveyor is used for the work. Molds also are made on moving conveyors, and reach completion only a few yards away from the hot ladles. The return trip allows the castings to cool before they reach the shake-out station, where they are removed from the flasks and the sand shaken out. After the fins and rough edges are chipped off another conveyor carries the castings to the tumbling barrels where they are tumbled until the surfaces are smooth. From there they go to the machining operations which are performed in the same building—a departure from conventional foundry practice, but which saves much hauling, particularly in the transportation of scrap back to the furnaces for remelting.

"All foundry sand is recovered and reclaimed, not for its intrinsic value, but to save freight and handling.

"The distinctive feature of this foundry is its unusual cleanliness. The soot, dust and terrific heat commonly associated with foundries are absent. An elaborate system of suction pipes, ventilators and dust collectors keep the air cool and clean. Heat is bottled up in where it belongs. The floors are paved and are kept clean, thus doing away with the constant clouds of dust which the old style dirt floor contributed to most foundries."

The Packard Motor Car Company, Detroit, also possesses an exceedingly modern and efficient foundry system. Like the Ford foundries the Packard foundries both, ferrous and non-ferrous, have been arranged for continuous operation. One sand handling and storage department supplies all foundries. There is a single core-making, baking, and finishing department effecting economies in operation. In this foundry a single operator with only the help of a skimmer, fills the cylinder molds assembled on roller conveyors. The old hand method, it is said, required the services of 20 men.

C. E. HOYT
Secretary-Treasurer, A. F. A.

Albert U. Widman, works manager of the Cadillac Motor Car Company states in the Michigan Manufacturer that foundry methods have been completely revolutionized during the last few years by requirements of the motor car industry. The complete standardization of parts and the elimination of hand-fitting demanded entirely new standards of accuracy which had previously been unknown in foundry practice, he says. For some of the most accurate of this work, permanent metal molds are now being used in place of sand.

For the sake of economy, most of the heavy manual work has been eliminated. Conveyors for sand, molten metal and castings save time and labor. In the Cadillac foundry, for instance, the operation of pouring the cylinder molds is now done by one man in a conveyor cab, with one helper—an operation which originally required 19 men.

DETROIT COPPER AND BRASS ROLLING MILL

In about four years more the Detroit Copper & Brass

Rolling Mills, at Detroit, Mich., will have rounded out half a century of business activity. As it was first incorporated under the laws of Michigan on April 15, 1880, it is now about 46 years old. That is a good long time and if one should take the trouble to investigate he would find very few concerns in any line of endeavor that have reached that ripe old age in Detroit or in fact anywhere throughout the middle west.

Lewis H. Jones, president and general manager, has been a member of the organization for the last 43 years or more. Frank H. Hoffman, assistant general manager, has a record of 22 years to his credit. Andrew J. Peoples, the secretary and treasurer, has been with the company for 25 years. Alexander Henderson, works manager, has been active in the institution for the last 30 years.

In addition to the foregoing executives is Arthur H. Buhl, vice president. There also is Richard P. Joy, another vice president of the company. Other strong men in the organization are Wallace P. Bache, assistant secretary and treasurer and J. Ernest Workman, auditor.

After the first 30 years of its existence and with the expiration of its charter, it incorporated again for another 30 years. From time to time under the old charter it had increased its capital stock. With the application for the new charter in 1910 it increased it again to $6,000,000 at which it stands today. The plant now covers twenty-five acres on Clark avenue near Jefferson avenue.

The original incorporators were C. H. Buhl, Theodore Buhl, Oliver Goldsmith, Frederick H. Seymour, Thomas Bissell and R. A. Alger. Then there is F. J. Hecker, who was elected a director January 14, 1882.

Production in this great plant reached its peak during the years of 1916, 1917 and 1918, the period of the great war. Then, after the armistice, the rush was not so great, but of late years it has been climbing steadily, like the other great industrial institutions in this territory.

The automobile industry, of course, has aided largely in the growth of the brass and copper industry in Detroit and the Detroit Copper & Brass Rolling Mills have kept pace. But it might be well to add, not all the copper and brass produced in Detroit goes into automobile construction. A great number of concerns are located here which are maufacturing other necessities other than automobiles. If all the motor car plants should cease operating today it would not necessarily mean there would be no call for brass and copper.

VARIOUS PROGRAMS AND COMMITTEES

The committees have arranged a great round of pleasures for the ladies. There will be motor car trips about the city, a visit to Belle Isle, a magnificent pleasure park in the Detroit river, luncheons and various other affairs to keep the ladies in the best of humor. Among the features will be a dancing party at the Masonic temple.

September is one of the best times of the year to visit Detroit. At that time the city has settled back into normal life following the vacation period and the visitors will have an opportunity to see the city just as it really is.

The following are the committees having the convention arrangements in charge.

Entertainment—W. J. Cluff, Frederick B. Stevens, Inc., Detroit, chairman.

Plant Visitation—H. M. Lane, H. M. Lane Company, chairman.

Hotel Committee—William J. Muhlitner, Great Lakes Foundry Sand Company, Detroit, chairman.

Ladies Committee—J. L. Mahon, American Car and Foundry Company, chairman.

ROBERT CRAWFORD
President, Detroit Foundrymen's Association

General Reception Committee. Mrs. Russell Scott, chairman.

Transportation Committee. Mrs. K. C. Babo, chairman.

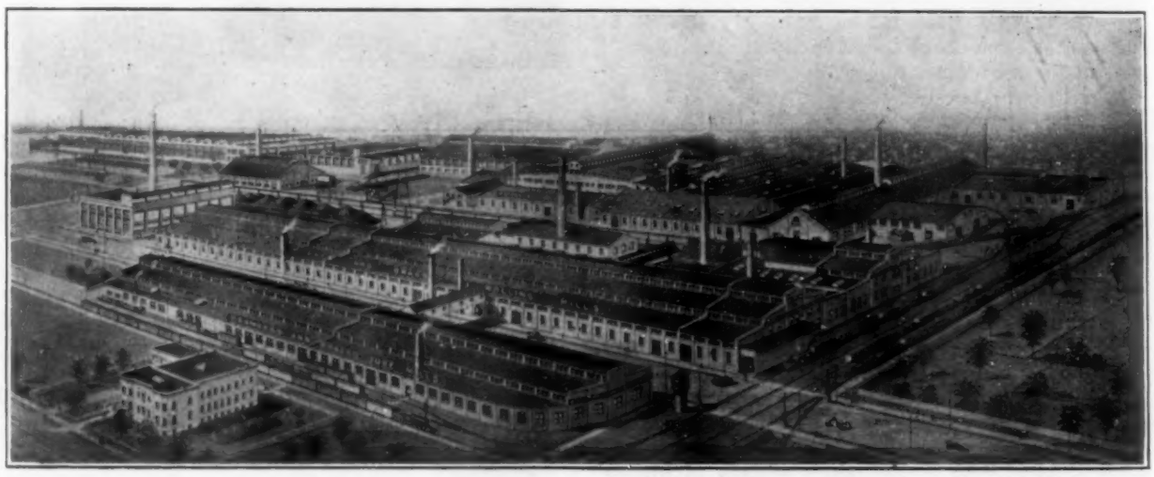
Transportation Committee. W. R. Thompson, Warner R. Thompson Company, Detroit, chairman.

Reception Committee. C. M. Culver, Employer's Association of Detroit, chairman.

Golf Committee. Fred Erb, Erb-Joyce Foundry Company, Vassar, Mich., chairman.

Officers of the Detroit Foundrymen's Association who are laboring strenuously in the interest of the convention are:

Robert Crawford, president, Atlas Foundry Company; J. L. Boland, vice-president, Griffin Car Wheel Company; Russell M. Scott, secretary, Packard Motor Car Company; Fred Cowan, treasurer, W. R. Thompson Company.



DETROIT COPPER AND BRASS ROLLING MILLS

Members Executive Board. K. C. Babo, Dodge Brothers; Vaughn Reid, City Pattern Works; Fred Erb, Erb-Joyce Foundry Company; H. M. Lane, H. M. Lane Company; J. Mahon, of the American Car & Foundry Company.

HOTEL ACCOMMODATIONS

Those who have not yet made hotel reservations should communicate at once with W. J. Muhlitner, 1368 Penobscot Building, Detroit, Michigan, who will take good care of all applicants.

Technical Program

Problems of the non-ferrous industry are to be discussed at three joint meetings of the A. F. A. and Institute of Metals Division of the A. I. M. E. and one special session of the Institute of Metals. Aluminum-alloys, temperature determination of the non-ferrous foundry metals and practical brass foundry problems are the topics to be taken up at the three joint sessions. The discussion of practical brass foundry topics will be taken up at a luncheon and the discussion will be of an informal round table nature following the custom set at the Syracuse Convention.

GENERAL SESSIONS

The sessions on core binders, materials handling, foundry refractories, and sand control should prove of interest to all groups of foundrymen. At the session on foundry refractories, the work of the recently organized joint committee on foundry refractories will be explained, and the results of surveys of refractories problems of the various branches of the industry discussed. In connection with the refractories session the committee will have on display, in a technical exhibit booth in the registration building, exhibits of refractories shapes emphasizing the need for simplification of the numerous varieties of refractory blocks for use in malleable furnaces and for steel ladle sleever and nozzles. At the two sessions devoted to foundry sand, recent practical shop control tests are to be presented in the form of papers and committee reports of the joint committee on molding sand research.

FOUNDRY COSTS

The A. F. A. committee on foundry costs will again sponsor a session for the discussion of this subject. E. W. McCullough of the United States Chamber of Commerce will explain the programs which is being made in development of cost keeping in the various industries of the country. R. A. Belt of the American Malleable Cast Iron Association will discuss fundamentals of foundry cost records. The committee will conduct a guessing contest similar to the one held at the Syracuse meeting. Patterns from malleable iron, steel and non-ferrous foundries will be on display and members of the association will be given an opportunity to estimate daily production and weights of castings produced from these patterns. Four prizes will be offered, one for each branch of the industry.

APPRENTICE TRAINING

The A. F. A. Committee on Apprentice Training has organized an apprenticeship molding contest of national scope. Molding contests have been held in five districts, Wilmington, Delaware; East Cambridge, Mass.; Erie, Pa.; Milwaukee, Wis.; and in the Moline, Ill.; Rock Island, Ill., and Davenport, Iowa, district. The castings of the apprentices winning the contests in the district contests will be on display in a booth at the Detroit Convention. A committee of judges of the A. F. A. will select the best castings from those on display and award prizes to the best in each group of the iron steel and non-ferrous entries. The German foundry association is planning to have on display the material of an apprentice training course, while the work of the French foundry high school will be on exhibit.

A discussion session on apprentice training will also be held at which those who have been undertaking foundry apprentice training will explain their work.

SAND TESTING EQUIPMENT

The various sand testing apparatus developed under the supervision of the joint committee on molding sand research will be on display. Demonstrators will be on hand to explain the operation of the equipment and the methods of testing.

FOUNDRY INSTRUCTORS MEETING

Instructors of foundry practice in technical schools have been invited to meet at a dinner gathering, Tuesday evening, September 28. Following the dinner, foundry instruction in schools will be discussed. Four papers outlining the purposes and methods of instruction at Carnegie Institute of Technology, the University of Michigan, Purdue University and the University of Illinois will be presented at this time.

Medal Awards Made to Prominent European Foundrymen and Metallurgists

The Second International Foundrymen's Congress will be signally commemorated by the granting of three of the American Foundrymen's Association gold medals to three prominent European foundrymen and metallurgists. The Board of Awards has had approved by the Board of Directors its reports recommending that Professor Thomas Turner of Birmingham, England, be granted the Joseph S. Seaman gold medal; that John Shaw of Sheffield, England, be granted the John A. Penton gold medal, and that E. V. Ronceray of Thiais, France, be granted the J. H. Whiting gold medal. Each of these men has contributed greatly to the advancement of foundry knowledge, Professor Turner as a metallurgist, John Shaw as a foundryman, and E. V. Ronceray as a foundryman and molding machine manufacturer.

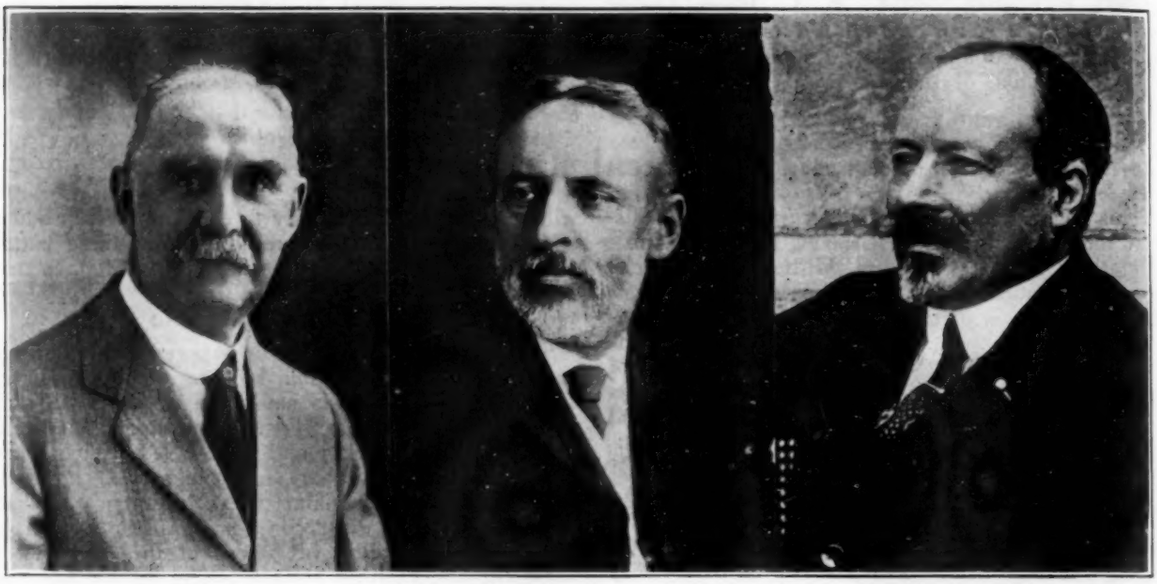
Professor Turner was elected an honorary member of the American Foundrymen's Association in 1901. He has contributed papers to the A. F. A. meetings and in large numbers to the European societies and technical press.

Mr. Shaw is a member of the Council of the Institute of British Foundrymen, a past president of the Sheffield branch, and the British member of the International Committee on Gray Iron Test Bar. He has been an active member of the A. F. A. since 1913. He presents the official I. B. F. exchange paper to the 1926 meeting of the A. F. A.

Mr. Ronceray has been a member of the A. F. A. since its organization in 1896, has presented a number of papers before the A. F. A. contributed greatly to the European foundry organizations and is a past president of Association Technique de Fonderie de France.

PROMINENT EUROPEANS TO APPEAR ON PROGRAM

The European Foundry Associations will be well represented at the technical sessions of the Detroit meeting



JOHN SHAW
Penton Medalist

THOMAS TURNER
Seaman Medalist

E. V. RONCERAY
Whiting Medalist

by seven papers; two being presented in behalf of the Association Technique de Fonderie (the French foundry technical association) one as the official exchange paper of the Institute of British Foundrymen, one as exchange paper of the Association Technique de Belgigue (the Belgian foundry association) two on behalf of the foundry association of Czecho-Slovak and two from Germany. One of the German papers will be presented by Dr. W. Guertler before the meeting of the Institute of Metals Division of the A. I. M. E. and it will be presented as a contribution from the Deutsche Gesellschaft fur Metallkunde (the German institute of metals). The second German paper will be presented before an American Foundrymen's Association session as a contribution from the Vereine Deutscher Eisengiessereien (the association of German foundries).

In addition to the official exchange paper of the Institute of British Foundrymen by John Shaw, a second paper from England will be presented by J. S. Hurst at the session on Permanent and Long-Life Molds.

Schedule of Metal Sessions

MONDAY, SEPT. 27

1:30 p. m. Opening Meeting. Address of Welcome and Responses.
3:00 p. m. Non-Ferrous Metals—Aluminum Alloys.
Materials Handling.
Core Binders and Mixtures.

TUESDAY, SEPT. 28

10:00 a. m. Non-Ferrous Metals—Temperature Determinations in Non-Ferrous Foundries.
Apprentice Training.
12:15 p. m. Luncheon Meeting and Round Table Discussion, Brass Foundry Problems.
2:00 p. m. Symposium—Permanent and Long Life Molds.
6:30 p. m. Foundry Instructor's dinner and meeting.
Alumni Dinner—Institute of Metals Division A. I. M. E.

WEDNESDAY, SEPT. 29

10:00 a. m. Institute of Metals Division, A. I. M. E.
2:00 p. m. Foundry Costs.
Foundry Refractories.

THURSDAY, SEPT. 30

10:00 a. m. Foundry Sand Control.
1:30 p. m. Business Meeting.
2:30 p. m. Elimination of Waste in the Foundry Industry.
6:30 p. m. Annual Banquet of A. F. A.

FRIDAY, OCT. 1

10:00 a. m. Foundry Sand Control.

Schedule of Papers

MONDAY, SEPT. 27

Session No. 1—1:30 p. m. Opening Meeting.
Addresses of Welcome and Responses.
Chairman—President A. B. Root, Jr.

Session No. 2—3:00 p. m. Aluminum and Aluminum-Alloys.
Joint Meeting of A. F. A. and Institute of Metals Division.
Chairmen—G. H. Clamer, Past President of A. F. A.; P. D. Merica, Chairman Institute of Metals Division A. I. M. E.

Constitution of Aluminum, Zinc, Tin Alloys and Aluminum Zinc. Cadium Alloys, by Dr. V. Jares, Technical School, Prague. Paper of Czecho-Slovak Foundry Association.

Aluminum-Alloy Permanent Mold Castings, by Dr. R. J. Anderson, Cleveland, Ohio.

Aluminum Castings of High Strength, by R. S. Archer

and Zay Jeffries, Aluminum Company of America, Cleveland, Ohio.

Report of Committee on Non-Ferrous Metals.

Session No. 3—3:00 p. m. Materials Handling.

Chairman—D. D. Fuller, Past President A. F. A.

Materials Handling in a Foundry, by E. T. Bennington, Cleveland Crane & Engineering Company, Wickliffe, Ohio.

Saving Foundry Materials Handling, by H. J. Payne, The Society for Electrical Development, New York, N. Y.

Session No. 4—3:00 p. m. Core Binders and Cores.

Chairman—W. J. Kihn.

A Standard Sand for Use in Testing Core Binders, by H. L. Campbell, University of Michigan, Ann Arbor, Michigan.

Core Sand Mixture Tests, by C. A. Hansen, General Electric Company, Schenectady, New York.

Methods for Determining the Properties of Cores Made with Cereal Binders, by H. L. Campbell, University of Michigan, Ann Arbor, Mich.

Report of Sub-Committee on Core Testing of the Joint Committee on Molding Sand Research.

TUESDAY, SEPT. 28

Session No. 6—10:00 a. m. Temperature Determination in the Non-Ferrous Foundry—A Symposium.

Joint Meeting of A. F. A. and Institute of Metals Division.

Chairmen—E. K. B. Patch, representing A. F. A.; W. M. Corse, representing Institute of Metals Division; A. A. Grubb, Ohio Brass Company, Mansfield, Ohio; H. M. St. John, Detroit Lubricator Company, Detroit, Michigan; Kirtland Marsh, Aluminum Company of America, New Kensington, Pa.; R. R. Clarke, General Electric Company, Erie, Pa.; Representative, U. S. Bureau of Standards, Washington, D. C.; A. S. Hall, Thwing Instrument Company, Philadelphia, Pa.; R. D. Bean, Brown Instrument Company, Philadelphia, Pa.

Session No. 7—10:00 a. m. Apprentice Training.

Chairman—H. A. Frommelt.

Discussion of Apprentice Training.

Session No. 8—12:15 p. m. Round Table on Brass Foundry Topics.

Chairman—G. K. Elliott.

Luncheon meeting and informal discussion.

Joint Meeting of A. F. A. and Institute of Metals Division.

Session No. 9—2:00 p. m. Permanent and Long-Life Molds—A Symposium.

Chairman—Jesse L. Jones; J. E. Hurst, Newton-Chambers & Company, Ltd., Sheffield, England; H. A. Schwartz, Cleveland, Ohio; Leon Cammen, The American Society of Mechanical Engineers, New York City; S. M. Udale and H. P. Kimber, the Holley Carburetor Company, Detroit, Mich.; James A. Murphy, Hamilton, Ohio; Dr. Richard Moldenke, Watchung, N. J.

6:30 p. m. Dinner and Meeting of Instructors of Foundry Practice in Technical Schools.

Chairman—O. W. Boston.

WEDNESDAY, SEPT. 29

Session No. 15—10:00 a. m. Meeting of Institute of Metals Division, A. I. M. E.

Chairman—Dr. Zay Jeffries, Vice-Chairman Institute of Metals Division.

The Utility of Nickel-Manganese and Iron Alloys in Making Special Brasses, by Dr. W. Guertler, The Technical High School, Charlottenburg, Germany. Presented in Behalf of the Deutsche Gesellschaft fur Metallkunde.

Exudation on Brass and Bronze, by W. B. Price and A. J. Phillips, Scoville Manufacturing Company.

Session No. 16—2:00 p. m. Foundry Costs.

Chairman—A. E. Hageboeck.

Discussion of general needs for foundry cost methods and exposition of a specific foundry cost system for practical use.

Report of Committee on Foundry Costs.

Costs, by E. W. McCullough, Manager, Department of Manufacture, The U. S. Chamber of Commerce, Washington, D. C.

Costs, by R. E. Belt, American Malleable Castings Association, Cleveland, Ohio.

Session No. 17—2:00 p. m. Foundry Refractories.

Chairmen—L. C. Hewitt, representing Joint Committee on Refractories; C. N. Ring, representing A. F. A. Committee on Refractories.

Report of the Chairman of the Joint Committee on Foundry Refractories.

Report of sub-committees on Service Conditions.

a. Steel Foundries.
b. Malleable Foundries.
c. Cast Iron Foundries.
d. Non-Ferrous Foundries.

Report of sub-committee on Testing and Specifications.

Report of sub-committee on Standardization and Simplification.

Discussion of Foundry Refractories.

THURSDAY, SEPT. 30

Session No. 19—10:00 a. m. Foundry Sand Control.

Chairman—R. F. Harrington.

Reports of sub-committees of Joint Committee on Molding San Research.

Discussion of Methods for Practial Shop Control of Foundry Sand Conditions.

Some Practical and Technical Data Obtained from the Use of Clay Additions to Molding Sand Heaps, by R. F. Harrington, A. S. Wright, and M. A. Hosmer, Hunt-Spiller Manufacturing Corporation, Boston, Mass.

A contribution on behalf of the New England Foundrymen's Association.

Strength Testing of Foundry Sands, by T. C. Adams, Cornell University, Ithaca, New York.

Tests to Show Proper Mixing of Foundry Sands, by H. W. Dietert, United States Radiator Corporation, Detroit.

Session No. 23—2:30 p. m. Elimination of Waste in the Foundry Industry.

Chairman—C. B. Connelley.

Discussion of Possibilities of Elimination of Waste.

Report of Committee on Pattern Equipment Standardization.

Report of Committee on Corrosion of Metals.

FRIDAY, OCT. 1

Session No. 24—10:00 a. m. Foundry Sand Control.

Chairman—Major R. A. Bull, Past President A. F. A.

Metallurgical Control of Foundry Sands, by L. B. Thomas, Fairbanks-Morse Company, Three Rivers, Michigan.

Grading Molding Sands, by C. A. Hansen, General Electric Company, Schenectady, New York.

The Effect of Mulling Time on Some of the Properties of Sand, by A. V. Leun, Cornell University, Ithaca, New York.

Some Experiments to Determine the Effect of Clay on the Fusion Point of Molding Sands, by D. W. Trainer, Cornell University, Ithaca, New York.

List of Exhibitors

Adams Co.....Dubuque, Iowa
Advance Milling Co.....Chicago, Ill.
Agnew Electric Welder Co.....Milford, Mich.
Air Reduction Sales Co.....New York, N. Y.
Ajax Electro-Thermic Corp.....Trenton, N. J.
Ajax Metal Co.....Philadelphia, Pa.
Albany Sand & Supply Co.....Albany, N. Y.
Allen Air Turbine Ventilator Co.....Detroit, Mich.
Alloys & Products, Inc.....Bronx, New York
American Brake Shoe & Foundry Co....Chicago, Ill.
American Electric Motors, Inc.....Milwaukee, Wis.
American Engineering Co.....Philadelphia, Pa.
American Foundry Equipment Co.....Mishawaka, Ind.
American Metal Market.....New York, N. Y.
American Steel Abrasive Co.....Galion, Ohio
American Vent Wax Co.....Lockport, N. Y.
Ames Shovel & Tool Co.....Boston, Mass.
Arcade Mfg. Co.....Freeport, Ill.
Asbury Graphite Mills.....Asbury, N. J.
E. C. Atkins & Co.....Indianapolis, Ind.
Austin Company.....Cleveland, Ohio
Automatic Transportation Co., Inc.....Buffalo, N. Y.
Franz K. Axmann, Machinenbau Anstalt.Koln-Ehrenfeld, Germany
Ayers Mineral Co.....Zanesville, Ohio

Baker-Raulang Co.....Cleveland, Ohio
C. O. Bartlett & Snow Co.....Cleveland, Ohio
H. L. Baumgardner Corp.....Chicago, Ill.
Beardsley & Piper Co.....Chicago, Ill.
Bellevue Industrial Furnace Co.....Detroit, Mich.
Berkshire Mfg. Co.....Cleveland, Ohio
Bethlehem Steel Co., Inc.....Bethlehem, Pa.
S. Birkenstein & Sons, Inc.....Chicago, Ill.
Black Diamond Saw & Machine Works..Natick, Mass.
Black & Decker Mfg. Co.....Towson, Md.
Blaw-Knox Co.....Pittsburgh, Pa.
Blystone Manufacturing Co.....Cambridge Springs, Pa.
Boyer Campbell Co.....Detroit, Mich.
Bradley Washfountain Co.....Milwaukee, Wis.
Brass World Publishing Co.....New York, N. Y.
Bridgeport Safety Emerywheel Co.....Bridgeport, Conn.
British Aluminum Co., Ltd.....New York, N. Y.
Buckeye Portable Tool Co.....Dayton, Ohio

Campbell-Hausfeld Co.....Harrison, Ohio
Carborundum Co.....Niagara Falls, N. Y.
Carr Fastener Co.....Cambridge, Mass.
Carter Bloxonend Flooring Co.....Kansas City, Mo.
Frank D. Chase, Inc.....Chicago, Ill.
Chicago Crucible Company.....Chicago, Ill.
Chicago Pneumatic Tool Co.....New York, N. Y.
Chisholm-Moore Mfg. Co.....Cleveland, Ohio
Clark Tructractor Co.....Buchanan, Mich.
Cleveland Flux Co.....Cleveland, Ohio
Cleveland Pneumatic Tool Co.....Cleveland, Ohio
Cleveland Wire Spring Co.....Cleveland, Ohio
Clipper Belt Lacer Co.....Grand Rapids, Mich.
L. A. Cohn & Bro.....Chicago, Ill.
Combined Supply & Equipment Co.....Buffalo, N. Y.
Corn Products Refining Co.....New York, N. Y.
Cresson-Morris Co.....Philadelphia, Pa.
Crown Rheostat & Supply Co.....Chicago, Ill.

Dayton Oil Co.....Dayton, Ohio
Dayton Pneumatic Tool Co.....Dayton, Ohio
Deister Concentrator Co.....Ft. Wayne, Ind.
Wm. Demmler & Bros.....Kewanee, Ill.
Detroit Core Oil Co.....Detroit, Mich.
Detroit Electric Furnace Co.....Detroit, Mich.
Detroit Hoist & Machine Co.....Detroit, Mich.
Detroit Range Boiler & Steel Barrel Co..Detroit, Mich.
Diamond Clamp & Flask Co.....Richmond, Ind.
Joseph Dixon Crucible Co.....Jersey City, N. J.
Dock & Mill Co.....North Tonawanda, N. Y.

Electric Controller & Mfg. Co.....Cleveland, Ohio
Electric Furnace Co.....Salem, Ohio
Electric Storage Battery Co.....Philadelphia, Pa.
Electro-Chemical Pattern & Mfg. Co....Detroit, Mich.
Electro Refractories Corp.....Buffalo, N. Y.
Elwell Parker Electric Corp.....Cleveland, Ohio

Fairbanks, Morse & Co.....Chicago, Ill.
Falk Corporation.....Milwaukee, Wis.
Falk Products Co.....Cadillac, Mich.
Fanner Mfg. Co.....Cleveland, Ohio
Federal Foundry Supply Co.....Cleveland, Ohio
Foundry Equipment Co.....Cleveland, Ohio
Fowler & Union Horse Nail Co.....Buffalo, N. Y.

Rudolf Geiger, Aktiengesellschaft.....Ravensburg, Wurttemberg, Germany
General Electric Co.....Schenectady, N. Y.
Globe Steel Abrasive Co.....Mansfield, Ohio
Great Lakes Foundry Sand Co.....Detroit, Mich.
Great Western Mfg. Co.....Leavenworth, Kans.
Grimes Molding Machine Co.....Detroit, Mich.
Harnischfeger Sales Corp.....Milwaukee, Wis.

J. W. Hallett & Co.....Detroit, Mich.
Benj. Harris & Co.....Chicago, Ill.
R. G. Haskins Co.....Chicago, Ill.
Hayward Co.....New York, N. Y.
Herman Pneumatic Machine Co.....Pittsburgh, Pa.
Hill & Griffith Co.....Cincinnati, Ohio
Holcroft & Co.....Detroit, Mich.
Holley Carburetor Co.....Detroit, Mich.
Houghland & Hardy.....Evansville, Ind.
Howell Electric Motors Co.....Howell, Mich.

Illinois Clay Products Co.....Joliet, Ill.
Independent Pneumatic Tool Co.....Chicago, Ill.
Indiana Coke & Gas Co.....Terre Haute, Ind.
Ingersoll-Rand Co.....New York, N. Y.
International Correspondence Schools...Scranton, Pa.
International Molding Machine Co.....Chicago, Ill.
International Nickel Co.....New York, N. Y.
Iron Age Publishing Co.....New York, N. Y.

Jennison-Wright Co.....Toledo, Ohio
Jeffry Mfg. Co.....Columbus, Ohio
Johnston & Jennings Co.....Cleveland, Ohio
W. A. Jones Foundry & Machine Co....Chicago, Ill.

Charles C. Kawin Co.....Chicago, Ill.
Keener Sand & Clay Co.....Columbus, Ohio
Keller Mechanical Engineering Corp....Brooklyn, N. Y.
Wm. H. Keller, Inc.....Grand Haven, Mich.
Spencer Kellogg & Sons, Inc.....Buffalo, N. Y.
Keystone Lubricating Co.....Philadelphia, Pa.
Kindt-Collins Co.....Cleveland, Ohio
King Refractories Co.....Detroit, Mich.
Knefler-Bates Mfg. Co.....Indianapolis, Ind.
H. W. Knight & Son.....Seneca Falls, N. Y.
H. Kramer & Co.....Chicago, Ill.
Chas. A. Krause Milling Co.....Milwaukee, Wis.

Lakewood Engineering Co.....Cleveland, Ohio
The H. M. Lane Co.....Detroit, Mich.
Lava Crucible Co. of Pittsburgh.....Pittsburgh, Pa.
Lewis-Shepard Co.....Boston, Mass.
Lindsay-McMillan Co.....Milwaukee, Wis.
Link-Belt Co.....Chicago, Ill.
Louden Machinery Co.....Fairfield, Ia.

C. E. McArthur & Co.....Chicago, Ill.
J. S. McCormick Co.....Pittsburgh, Pa.
R. W. McIlvaine Co.....Chicago, Ill.
MacLean Publishing Co.....Toronto, Ont.
MacLeod Co.....Cincinnati, Ohio
Malleable Iron Fittings Co.....Branford, Conn.

Marshall Blow Pipe Co.....Detroit, Mich.
Mathews Conveyor Co.....Ellwood City, Pa.
Mathieson Alkali Works, Inc.....Chicago, Ill.
Metal Industry.....New York, N. Y.
Metal & Thermit Corp.....New York, N. Y.
Michigan Smelting & Refining Co.....Detroit, Mich.
Alexander Milburn Co.....Baltimore, Md.
Miller-Hurst Corp.....Detroit, Mich.
H. E. Mills Mfg. Co.....Syracuse, N. Y.
Milwaukee Foundry Equipment Co.....Milwaukee, Wis.
Modern Pouring Device Co.....Port Washington, Wis.
Moline Iron Works.....Moline, Ill.
Monarch Engr. & Mfg. Co.....Baltimore, Md.

National Engineering Co.....Chicago, Ill.
New Haven Sand Blast Co.....New Haven, Conn
Niagara Falls Smelting & Refining Corp.Buffalo, N. Y.
Wm. H. Nicholls Co., Inc.....Brooklyn, N. Y.
Norma-Hoffman Bearings Corp.....Stamford, Conn.
North American Mfg. Co.....Detroit, Mich.
Northern Engineering Works.....Detroit, Mich.
Norton Company.....Worcester, Mass.

S. Obermayer Company.....Chicago, Ill.
Oiless Core Binder Co.....Cleveland, Ohio
O. K. Tool Co.....Shelton, Conn.
Oliver Machinery Co.....Grand Rapids, Mich.
Osborn Manufacturing Co.....Cleveland, Ohio
Oxweld Acetylene Co.....New York, N. Y.

Pangborn Corporation.....Hagerstown, Md.
Patent Cereals Co.....Geneva, N. Y.
J. W. Paxson Co.....Philadelphia, Pa.
Peerless Sand Co.....Conneaut, Ohio
Penton Publishing Co.....Cleveland, Ohio
Geo. W. Perks & Co.....Akron, Ohio
Charles Pettinos.....New York, N. Y.
Geo. F. Pettinos.....Philadelphia, Pa.
Pickands, Brown & Co.....Chicago, Ill.
Pittsburgh Electric Furnace Corp.....Pittsburgh, Pa.
Portage Silica Co.....Youngstown, Ohio
Porter-Cable Machine Co.....Syracuse, N. Y.
Production Equipment Co.....Cleveland, Ohio

Quigley Furnace Specialties Co.....New York, N. Y.

Racine Tool & Machine.....Racine, Wis.
Richards-Wilcox Mfg. Co.....Aurora, Ill.
Robeson Process Co.....New York, N. Y.
Rogers Brown & Crocker Bros., Inc....Cincinnati, Ohio
Rohrbacher Shoe Co.....Boston, Mass.
Rollway Bearing Co., Inc.....Syracuse, N. Y.
Ross-Tacony Crucible Co.....Philadelphia, Pa.
Royer Foundry & Machine Co.....Kingston, Pa.
Royersford Foundry & Machine Co.....Philadelphia, Pa.
Ruemelin Mfg. Co.....Minneapolis, Minn.

Sabin Machine Co.....Cleveland, Ohio
Safety Emery Wheel Co.....Springfield, Ohio
Safety First Shoe Co.....Boston, Mass.
Semet Solvay Co.....Detroit, Mich.
Shepard Electric Crane & Hoist Co.....Montour Falls, N. Y.
Simons Paint Spray Brush Co.....Dayton, Ohio
Skeppstedt-Erickson Company.....Moline, Ill.
Skybryte Co.....Cleveland, Ohio
W. W. Sly Mfg. Co.....Cleveland, Ohio
Smith Oil & Refining Co.....Rockford, Ill.
Werner G. Smith Co.....Cleveland, Ohio
Spencer Turbine Co.....Hartford, Conn
Springfield Aluminum Plate & Casting Co.Springfield, Ohio
Standard Sand & Machine Co.....Cleveland, Ohio
Standard Silica Co.....Chicago, Ill.
Sterling Wheelbarrow Co.....Milwaukee, Wis.
Frederic B. Stevens, Inc.....Detroit, Mich.
Stoney Foundry Engineering & Equipment Co.....Cleveland, Ohio
Sugar Pine Sales Co.....San Francisco, Cal.
Sullivan Machinery Co.....Chicago, Ill.
Sundstrand Machine Tool Co.....Rockford, Ill.
Superior Sand Co.....Cleveland, Ohio
Superior Sizing Co.....Lockport, N. Y.
Swartwout Company.....Cleveland, Ohio

Tabor Mfg. Co.....Philadelphia, Pa.
Taylor Instrument Companies.....Rochester, N. Y.
Tessmer Machine & Tool Co.....Detroit, Mich.
Warner R. Thompson Co.....Detroit, Mich.
Tiona Petroleum Co.....Philadelphia, Pa.
Transmission Ball Bearing Co.....Buffalo, N. Y.
Truscon Steel Company.....Youngstown, Ohio
W. S. Tyler Co.....Cleveland, Ohio

United Compound Co.....Buffalo, N. Y.
United States Electrical Tool Co.....Cincinnati, Ohio
United States Graphite Co.....Saginaw, Mich.
United States Silica Co.....Chicago, Ill.

Wadkin & Co.....Leicester, England
Wadsworth Core Machine Equipment Co.Akron, Ohio
J. D. Wallace & Co.....Chicago, Ill.
Warner & Swasey Co.....Cleveland, Ohio
Jervis B. Webb Co.....Detroit, Mich.
Weldit Acetylene Co.....Detroit, Mich.
Westinghouse Electric & Mfg. Co.....E. Pittsburgh, Pa.
Westinghouse Traction Brake Co.....Pittsburgh, Pa.
Whitehead Brothers Co.....Buffalo, N. Y.
Whiting Corp.....Harvey, Ill.
G. H. Williams Co.....Erie, Pa.
E. J. Woodison Co.....Detroit, Mich.
Worthington Pump & Machinery Corp..Cincinnati, Ohio

Yale & Towne Mfg. Co.....Stamford, Conn.
Young Brothers Co.....Detroit, Mich.

POURING A LARGE SPECIAL CASTING AT THE FORD BRASS FOUNDRIES

Mixing Babbitt

A Problem in White Metal and Its Solution

Written for The Metal Industry by W. J. REARDON, Foundry Editor

Q.—We expect to make use of metal alloys consisting of about 52 per cent tin, 47 per cent lead and 1 per cent antimony. Would you advise us to buy the three elements separately and mix ourselves or have this mixture furnished us? We are wondering whether or not these metals will mix readily without stirring or any special equipment. We will not use over a few hundred pounds or perhaps one ton per year for the first year or two. We may also desire to try other alloys, probably consisting mostly of the above-named metals.

We are making use of some of the Liberty motor genuine babbitt. It seems that this metal may be very satisfactory for the same purpose. We expect to use the alloys mentioned in the paragraph above. Can you advise what Liberty motor babbitt consists of and whether there is likely to be any saving in making this alloy or mixture ourselves over buying it as made?

When we use alloys we will, of course, have to liquify them as the metal is to be used as an outside layer of about ¼" thickness on pieces of steel shafting varying in length from six inches to fourteen inches, making a finished job of abou 3¼" outside diameter.

In preparing a steel shaft for a ¼" outside layer of the alloy we understand it is necessary that the steel be given a good tin coating so that the alloy will adhere firmly. It would seem, however, that an alloy consisting of a large percentage of tin might adhere well to a polished steel shaft that has not been previously tinned.

If a tin coating is necessary we would like advice as to where we might learn the best method of doing this. In the beginning before we get into production a few of the shafts will be tinned by hand with a soldering outfit, but this would probably be too slow as soon as we equip for turning out 100 or more of such shafts a year or during a few months of the year. Is there some good process or outfit of simple construction available or would it be most practical to install an electro plating outfit?

We have not yet determined on the kind of steel shafting to be used but understand something better than cold rolled shafting is best for the purpose, as we must be certain that there be no warping.

A.—If you wish to make a mixture of 52 tin, 47 lead, 1 antimony, all that is required is to get an iron pot of convenient size to suit your work, from any of the foundry supply houses.

Melt the lead and add the antimony; then add the tin, stir well and pole a little by inserting a piece of wood to the bottom of the pot and let the metal boil for a few minutes. Flux with a handful of rosin. It may be just as cheap to have the alloy made up by some smelter and you will only have to carry one metal in stock; also only the amount you would require. If you make the metal yourself you must carry in stock tin, lead and antimony. However, you can make the alloy yourself as well as anyone.

The same process applies to Liberty Motor, genuine babbitt, which consists approximately of 89 tin, 8 antimony, 3 copper.

In reference to tinning, this is a very simple operation. The work must be pickled first in a mixture of 1 part of muriatic acid to 16 parts of water. If the work is greasy or covered with paint, use a hot solution of caustic soda previous to pickling, then dip in a flux consisting of chloride of zinc before dipping in a tin pot. If there are any lumps sticking to the work, they can be wiped off with a cloth or wire brush.

Q.—We have your reply enclosing answer to our inquiry, which is good and to the point.

In pouring the liquid alloy around tinned shafts in order to put on a layer of about ¼" to ½" thickness we presume it would be very advisable that the shaft and outside form be previously heated so that the metal will have time to set and cool slowly, thereby eliminating air holes or metal of porous and pitted formation. It is very necessary that this metal be smooth and solid. If you can give us any information regarding a nice little equipment which might be had or made which would be best suited for the pouring and casting of this metal on round shafting, please advise. The size of shafting will not exceed over 2½ to 4 inches in diameter and in varying lengths from 24" to 6". Our mechanic can devise the proper forms and equipment but from your point of view the writer believes perhaps you can tell us something of value for the purpose.

There is also some other information desired as follows. The round shafting to be used for our purpose had better be something else than cold rolled steel, as we know this material will warp some, especially if some of the outer surface is turned off. We do not wish to use anything more expensive than necessary, but ought to use some good grade shafting which can be depended upon not to warp more than one thousandth of an inch, as the rollers which are to make up a special machine must remain very true.

We would like to know regarding the different kinds of shafting obtainable on the market and their comparative costs. Probably a shafting of the kind used in woodworking machinery would be good. We might purchase it either turned and polished or in the rough. We have only a small machine shop and one lathe and it seems to the writer, therefore, that it would pay to buy our shafting turned and polished as we have no special equipment which would do this and likely show us a saving. Our mechanic, however, may have spare time while other machinery is operating to turn and polish shafts bought in the rough.

A.—In reference to previously heating the shaft before pouring the metal, it is advisable to heat as you state.

There are many devices used in babbitt bearing that would be suitable for your work. However, we are of the opinion that your mechanical department can devise a method to suit your purpose much better than any you can buy, as it is always necessary to design your equipment to meet your conditions.

As to the different kinds of shafting on the market—prices, etc., we would suggest you write to any of the large steel manufacturers in your locality and they will furnish you with the desired information as to what grade is best to use and information on warping. In fact they will tell you everything you may desire on steel shafting.

The Fundamentals of Brass Foundry Practice

A Description of the Basic Laws Which Control the Melting and Casting of Metals and Their Application to Practical Foundry Operations *—Part 3

Written for The Metal Industry by R. R. CLARKE, Foundry Superintendent

BUOYANCY

Buoyancy is the next subject to be considered. By buoyancy we mean upward pressure of a liquid on a solid in it. In moulding, it has to do chiefly with the displacing and breaking of cores and the capacity of metal at varying fluidities to rid itself of dross. The following will illustrate the principles of buoyancy.

If a 6-inch square, 1-inch thick core be immersed with the flat side downward into liquid iron it will meet a maximum of resistance due to buoyancy. If immersed edgewise, the resistance will decrease in proportion to the decrease in surface from the flatside to the edge. A six-inch cubical core will meet the same resistance as the flat core, but the effect is reduced in proportion to the weight of the two cores. If these immersions are made at an

FIG. 7. LONG THIN CORES BEND COPEWARD IN THE MOLD. Stiff-rodding the core, anchoring the core at and near middle points and inclining the mold in pouring are a few of the common remedies.

angle of say 60° to the liquid surface, the resistance along this 60° line will decrease as it nears the perpendicular. If these immersions are in liquid aluminum instead of iron, the resistance will decrease in proportion to the lower specific gravity of the aluminum.

If a core is anchored in a body of fluid iron and an identical core is similarly anchored in semi-fluid iron and both cores released simultaneously, the core in the fluid iron will rise more freely and rapidly than in the semi-fluid iron. It can be said therefore that: **Buoyancy Acts Vertically Upwards and Varies With the Surface, Weight and Specific Gravity of the Body Immersed; With the Angle of Immersion, With the Fluidity and Specific Gravity of the Liquid Metal.** In connection with the foundry application of these principles the following practical suggestions are submitted:

FIG. 8. BUOYANCY TWISTS CORE UPWARDS AND OUT OF CENTRE. Square core prints and close fitting into the sand is the common remedy.

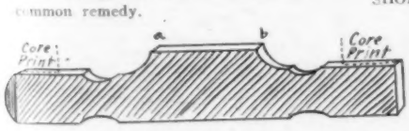


FIG. 9. METAL BUOYANCY PLAYING ON SURFACE a-b, throws core section out of line of mold at points opposite a-b. Rectangular prints overcome the tendency.

1—All core prints should be sufficiently long; short ones menace the casting.

2—Buoyant pressure is greater than core weight, as metal is heavier than sand. Cope sand over prints should be rigid and further supported by iron cross strips when necessary.

3—Weights or plates clamped down should always cover sand over prints.

4—Cores with large surface exposed to the force of buoyancy should be anchored firmly.

5—Never expose an anchor to the molten metal if it is possible to avoid it.

6—Friction and pressure of metal rising along the perpendicular walls of a core is sufficient to lift and let metal under the core print base, unless the core is safely secured. The idea that a core cannot rise unless metal gets under it is in error.

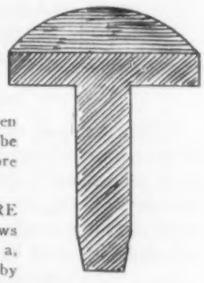


FIG. 10 (above). PERPENDICULAR LIFT OF BUOYANCY WILL RAISE CORE IF NOT RIGIDLY SECURED. Paste around print is not sufficient. Core should be secured either by chaplet on the top or stay-bolt bedded in the core and proceeding through the bottom board. When resorting to the latter, iron washer should be rammed up over bottom of core print to give core a solid, unyielding bearing in bolting down.

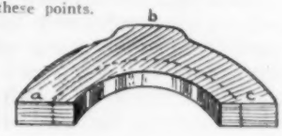


FIG. 11 (below). SEMI-CIRCULAR CORE FOR OIL DEFLECTOR. Dotted line shows core print. Core must be anchored at points a, b and c against buoyancy; can be safely nailed by embedding nails to good bearing at these points. Metal used, aluminum-tin-nickel alloy. Core cuts through at points a, b and c. Pattern represents bad judgment in pattern design and was later changed with extended core prints at a, b and c.

7—Cores rising or breaking in molds poured on the level can often be saved by inclining the mold in pouring. This modifies the perpendicular lift of buoyancy.

8—Cores, after lying in the mold, or cores engaged by molten metal differ vastly in strength and rigidity from cores in the atmosphere.

9—Long cores lying longitudinally in the mold allow greater leverage to buoyancy and require stronger supports in the nature of rods, etc.

10—Pipes of equal length and diameter are stronger than solid bars.

11—Twisting a core rod, as by torsion, increases its strength.

12—Metal anchors on cope sides of cores should be amply heavy to hold the core down after the anchor is heated by the metal. It's a fallacy to assume that the core will not rise after the metal has completely enveloped it.

13—A core will rise in brass or iron that aluminum would leave unmolested.

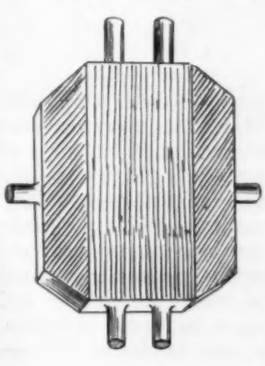


FIG. 12. (Left). BROAD, EXPANSIVE SURFACE CORES ARE HARD HIT BY BUOYANCY. Core must be amply and firmly rodded and secured with anchors in the mold.

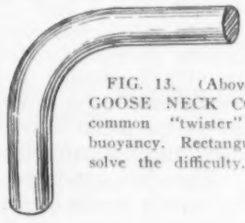


FIG. 13. (Above). THE GOOSE NECK CORE. A common "twister" due to buoyancy. Rectangular prints solve the difficulty.

 Parts 1 and 2 were published in our issues of July and August, 1926.

14—Fluidity of metal increases with temperature. Dirt and dross, in the process of manufacture in molten metal, will not rise freely in metal of low fluidity but will be entrapped in that metal and cause an inferior casting. Every casting should be poured hot enough to give the metal such fluidity as will freely float its dirt and dross to the surface.

15—All cores, one end or part of which terminate in the metal unsupported by a print, should have most of their weight in the print ends, or have those ends so shaped that they will be secure against the lifting effect. Enlarged prints made square or rectangular; prints containing projections downward of the core and at right angles to the body of the core, etc., are two of the possibilities.

16—Wherever possible, the mold should be poured in the position that permits the force of buoyancy to act on the minimum of core surface; the vertical as against the horizontal position of the mold covers a wide range in this respect.

ACTION AND REACTION

The third law of motion concerns action and reaction in their equal effect and their opposite directions, and applies to foundry practice through this inevitable relation between all liquid metal in moving or static state and all sand surface confines engaged by it. To appreciate this principle it must be known that when one body strikes or presses against another the body acted on strikes or presses back oppositely in direction and with exactly the same force as the acting body. The word "action" in this sense does not necessarily involve motion. A ball lying on a table represents action just as plainly as a ball dropped on the same table. The ball at rest expresses the action of gravity pressing the ball down against the table which is equalled by the reaction of the table pressing up against the ball. Two balls of equal volume and weight rolling toward each other with the same velocity on a level surface will meet and bound back with the same force and to equal distances from the meeting point.

Metal dropping, flowing or lying against a sand surface represents so much action against that surface and is met by its equal of reaction from that surface. In the case of the metal falling or flowing against the surface, action and reaction equal the momentum of the metal at the instant of impact and revert to the laws of falling bodies and the first law of motion. When lying still against the surface the action and reaction equal the liquid pressure and fall under the hydrostatic principles.

The "cutting," "scabbing" and "blowing up" of hard rammed sand surfaces as well as the shrinking away from these surfaces either from the side inward or from the top downward involve the principle of action and reaction. Of course, it cannot be said that mere reaction always does all the damage. If the sand hopper is too wet the same results follow from a basic cause quite distinct from reaction. Even when the sand is right and the surface hard, reaction, though primarily, is yet not exclusively responsible. Hard-rammed sand by its very compactness offers greater resistance to the escape through it of gases generated by the metal in it. These gases therefore stay in the metal and link up with the reaction of hardness of surface. The two combined start the agitation in the metal that results in the tearing away of the sand surface. That is the basic reason for the cutting, scabbing, shrinking, etc., of metal dropping, flowing or lying against hard sand surfaces. The reaction of hardness plus the inbound activity of gases simply start the metal to kicking and boiling and the sand surface collapses under the agitation.

The question at hand then, is how to defeat this reaction, and absorption is the solution. The action of the metal against the sand surface and the reaction of the surface against the metal must be to a maximum absorbed. Softness or cushion effect of the surface is the remedy and points to the vast significance of the proper method of ramming a mold and of gating a mold with respect to the softness or cushion effect of the gate surfaces.

Any hard, glazed or polished sand surface is low in absorptive powers. Any soft or slightly roughened surface is relatively high in these powers. Liquid metal will therefore engage the latter much more placidly than the former. In pouring a mold the first application of action and reaction occurs in the pouring sprue. In pouring any mold the ladle lip is more or less out of line, backward from the sprue. The metal therefore enters the sprue by the curve of descent and strikes the forward wall of the sprue in proportion to the curvature of flow, the distance of flow, the diameter of sprue and the position of the ladle lip in pouring. The correct pouring of any mold, therefore, demands that the lip of the ladle be as close down to the mouth of the sprue as possible in order to cut down the distance of flow, that it be so positioned that the metal enter the sprue just over the edge of the sprue wall nearest to the ladle lip in order to throw the forward and opposite sprue wall beyond the curve; that the sprue be of sufficient diameter to aid in the objective, and that the sprue wall be consistently soft and unglazed in order to absorb the action and its reciprocating reaction.

From these reasonings the conclusion is vastly significant that the condition of the sand and that the ramming of the sand around sprues and gates is one of the very particular phases of molding. Sometimes a sprue is set and rammed up with the mold. Sometimes again it is punched with a pipe. Of the two the former is by far the more logical. Punching a sprue hardens and glazes the surface, the very thing we want to escape. In the lighter classes of work the author permits the sprue to be punched. In the heavier and more particular work, he will not tolerate it. Many points might be noted for setting rather than punching the sprue. About the only point in favor of punching it is that it constitutes the easier and quicker method.

The next application of the action and reaction principles occurs at the bottom of the sprue where the metal strikes and changes direction through the runner gates. Here the impact, action and reaction are all hard and call for a properly constructed button gate to absorb the shock. Every mutton gate should be constructed on a diameter slightly larger than the sprue it underlies, it should be of sufficient depth below the depth of the runner gate to which it is attached to form a pool of metal and should have its button and side surfaces consistently rough and soft. Properly to construct a button gate, ream the sand loose to at least one-half inch greater than all dimensions of the desired pool, lift the center of this reamed sand out, in sufficient quantity to allow the sand remaining to be fingered consistently soft to the proper shape and size. Merely to cut or ream the sand out and blow it away, or to press a form into the sand does not by any means make a logical button gate. The trend of modern practice seems to be toward discounting the button gate and in the hurry-up systems of the day it is often overlooked. The tendency is a bad one, and should everywhere be discouraged. Button gates absorb the shock of impact and eliminate the splattering of falling metal. They are a common sense asset to scientific practice and should always be in evidence. Any casting will pour clearer and be more satisfactory with than without it.

This series will be continued in an early issue.—Ed.

British Institute of Metals

Abstracts of the Papers Read at the Autumn Meeting in Liege, Belgium, September 1-4, 1926

AN ACCOUNT OF THE NON-FERROUS METALS INDUSTRY IN THE LIÉGE DISTRICT

By L. Boscheron

An historical account is given of the development of the zinc industry of the Liége district of Belgium, with particular reference to the discovery of the distillation process by Dony and the subsequent improvement and application of this process. The absence of water power and the high cost of electrical energy in Belgium renders the new electrothermic and electrolytic methods of manufacture of zinc inapplicable in Belgium, where the discovery of a method of continuous production would be welcomed.

THE CONSTITUTION AND STRUCTURE OF THE COMMERCIAL ALUMINIUM-SILICON ALLOYS

By A. G. C. Gwyer and H. W. L. Phillips

With an Appendix upon

THE PROPERTIES OF THE MODIFIED ALUMINIUM-SILICON ALLOYS

By D. Stockdale and I. Wilkinson

The investigation deals with the constitution, structure, and mechanical properties of modified aluminium-silicon alloys, and a theory based upon colloidal lines is put forward to explain the nature of the modified structures. Examples are given of the application of this theory to other alloy systems. The alloys possess good founding qualities; are appreciably lighter than pure aluminium, and in both chill- and sand-cast states possess a high resistance to shock, excellent ductility, and a high degree of incorrodibility.

SOME MECHANICAL PROPERTIES OF SILICON-ALUMINIUM ALLOYS

By J. D. Grogan

The paper describes the sodium and "salts" methods of modifying these alloys. The "salts" method is preferred. Some mechanical properties of one inch diameter chill- and sand-cast bars are given. Ternary alloys containing also magnesium or zinc are not superior to the binary alloys.

SILUMIN AND ITS STRUCTURE

By Buntaro Otani

The chief development of aluminium-silicon alloys during the last three years has been in the direction of a marked increase in mechanical properties, due to the modifying action caused by the addition of metallic sodium or alkali fluoride to the molten alloy.

The present author puts forward a theory which will satisfactorily explain the process of modification.

SOME FURTHER EXPERIMENTS OF THE BEHAVIOR OF SINGLE CRYSTALS OF ALUMINIUM UNDER REVERSED TORSIONAL STRESSES

By H. J. Gough, S. J. Wright and D. Hanson

The paper is an experimental study of the phenomena exhibited by single crystals of aluminium when subjected to alternating torsional stressing. The resulting distortion under this complex type of straining action is observed using slip-band measurements, and is related to the atomic orientation of the crystals by means of X-ray analysis. The observed complicated system of slip-bands is then shown to be in agreement with the simple law that slip is confined, at any point of the surface of the crystal to one of the octahedral planes and in the direction of the most highly stressed (shear stress) principal lines of atoms. The progressive hardening during a long endurance test has been studied and the phenomena attending the last stages of the test have been isolated from those of the earlier stages. Some quantitative data regarding hardening by slip have been deduced from ball identation tests made on cross-sections of the specimens used.

THERMAL ANOMALIES OF CERTAIN SOLID SOLUTIONS

By P. Chevenard

Certain feebly magnetic solid solutions show transformations which are similar to those of ferromagnetic substances in that they occur without change of phase (that is, change of space lattice), they are spread out over a large range of temperature, they are subject to relatively slight hysterasis, and result in anomalies in the different physical properties, dilatation, specific heat, resistivity, thermo-electric power, etc. They differ from the magnetic transformations in that the temperature of their occurrence does not vary with change of composition.

Evidence is given of the existence of these so-called "X" transformation in a copper-aluminium, nickel-chromium, and copper-nickel solid solutions, and a detailed study is made of their effect on the dilatation of the first two groups of alloys and on the resistivity of the last. The variation of the position and magnitude of these anomalies with change of composition is noted, and the co-efficients of dilatability and resistivity at each temperature over a wide range have been determined in some cases.

PRELIMINARY EXPERIMENTS ON THE COPPER-MAGNESIUM ALLOYS

By W. T. Cook and W. R. D. Jones

An account of the preliminary experiments of a research on copper-magnesium alloys. The chief feature is the production of sound chill-cast bars free from smooth-sided internal gas cavities by means of a double-melting process, similar to that recently recommended by Archbutt for the production of castings in aluminium free from pinholes. Details are given of the method adopted and of a type of bottom-pouring crucible used to eliminate inclusions of flux and slag. The properties of chill-cast bars containing up to 10 per cent copper are recorded. The microstructure, macrostructure, and the effects of the double-melting are illustrated by means of photographs.

A COMPARISON OF STATIC AND DYNAMIC TENSILE AND NOTCHED-BAR TESTS

By Kotaro Honda

Machines for testing materials have recently considerably increased in number; for instance, referring to the methods of testing, there are the following tests:—tension, bending, torsion, toughness, fatigue, abrasion, hardness, and single and repeated impact tests, etc. Since for each of these tests we have several types of machines, the number of types of testing machines as a whole is very large, and, further, new machines are continually being

invented. Consequently, it is of importance to study the merits and demerits of these machines and to make a selection of those which are best for the purpose. In the Research Institute for Iron, Steel, and other metals, Sendai, Japan, an investigation in this direction has already been commenced; in the present communication some general considerations regarding the relation between impact and static tension tests, and impact and static bending tests, and also regarding the method of measuring fatigue, are given.

THE DEFORMATION OF TUNGSTEN CRYSTALS

By C. J. Smithells, H. P. Rooksby and W. R. Pitkin

It is known that when metals are rolled or drawn the crystal fragments tend to take up a definite orientation with respect to the direction of working. In the present paper it is shown that the same effect is produced during the swaging of tungsten rods. The micro-structure and X-ray diffraction pattern at various stages of the swaging of tungsten rods have been examined with a view to understanding the mechanism by which this "preferred" orientation is attained. Three kinds of material have been used, comprising fine-grained rods having 2,250 grains per sq. mm., coarse grained rods having 650 grains per sq. mm., and rods in which the crystals had an average diameter of 5 mms., and occupied locally the full cross-section of the rod.

SEASON-CRACKING IN ARSENICAL TUBES

By A. Pinkerton and W. H. Tait

The authors claim to have shown that, while severely hollow sunk tubes made from arsenic-free, deoxidized copper are not liable to season-cracking, tubes made from arsenical copper, according to the British Engineering Standard Specification, are liable to season-cracking when made under certain conditions. The temperature at which annealing renders such tubes immune from season-cracking has also been determined.

THE ACTION OF HYDROGEN ON HOT SOLID COPPER

By Cyril S. Smith and C. R. Hayward

When copper (wire) containing oxygen is heated in hydrogen, maximum brittleness is obtained at intermediate temperatures, and a marked recovery occurs when the action is carried out at temperatures approaching the melting point.

The rate of penetration of hydrogen into cast copper has been determined and certain peculiarities observed. When the oxygen in the copper exceeds 0.07 per cent the depth of penetration in a given time is greater at about 800°C. than at higher temperatures. A theory is advanced to account for this.

When brittle "gassed" copper is annealed and forged in a non-oxidizing atmosphere, the cracks responsible for the brittleness close, and metal of remarkable properties is obtained.

BRONZE WORM-GEAR BLANKS PRODUCED BY CENTRIFUGAL CASTING

By Francis W. Rowe

The paper describes the general metallurgical features which obtain in bronze worm-wheel gears cast by various methods, and the improvements which result from casting these wheels by the centrifugal method.

THE CONSTITUTION AND AGE-HARDENING OF SOME TERNARY AND QUARTERNARY ALLOYS OF ALUMINIUM CONTAINING NICKEL

By Kathleen E. Bingham

This investigation is part of a scheme of research on aluminium alloys which has been in progress in the Metallurgy Dept. of the National Physical Laboratory, under the direction of Dr. W. Rosenhain, F. R. S., for some considerable time. It consists of two parts, the first dealing with the age-hardening of some of the ternary alloys of copper, nickel, and aluminium; while the second deals with the constitution and age-hardening of similar alloys, with the addition of magnesium.

DEVELOPMENT OF THE USE OF NICKEL IN COINAGE

By Captain F. R. Barton

The paper deals with the historical development of the application of nickel to coinage, and the difficulties encountered and overcome in adapting it to this purpose. In its pure form, as well as a constituent of binary alloys, nickel has been widely adopted during the last half century as a coinage metal. Experience shows that pure nickel coins wear longer in circulation than silver, and that they are equally proof against counterfeiture.

THE CONSTITUTION AND THE PHYSICAL PROPERTIES OF THE ALLOYS OF CADMIUM AND ZINC

By C. H. M. Jenkins

This paper contains the results of a study of the metallography and the physical properties of some of the alloys of cadmium and zinc. The constitution and properties of the zinc-rich alloys seems to be considerably influenced by the two polymorphic changes which appear to exist in zinc. One of these changes caused an increase in the solid solubility of cadmium in zinc above the eutectic temperature, the resulting equilibrium diagram is therefore somewhat unusual containing a region representing a completely solid alloy occurring above an area which is composed of both liquid and solid alloys. It has been found that the cold-worked alloys very slowly soften at room temperature, but the effect of ageing does not cause any unfavorable alteration. The zinc-rich alloys should not, however, be annealed subsequently to this ageing. The properties of cast and rolled zinc appear to be improved by the addition of cadmium. The eutectic alloy, previously proposed for use as a medium hard solder, possesses very suitable properties for this purpose.

THE PRIMITIVE COPPER INDUSTRY OF AMERICA—PART II

By George Brinton Phillips

"Native Indian Art in Copper." An account of the specimens of hammered copper-arrow heads, tools, and ornamental objects made by prehistoric Indians which have been found in the fields, village sites, and burial mounds in the United States. Many thousands of such objects have been investigated; they show a somewhat sporadic industry, but considerable mechanical skill and artistic taste in their manufacture with stone and bone tools by the aborigines. The analysis of these hammered copper specimens indicates the source of the metal to be the native copper from the mines of Northern Michigan and not copper brought from Europe.

Small Roll Equipment

Q. Were there any revolutionary changes in the small roll equipment installed in the West Virginia Metal Product Corporation. I have been told that the production from these mills would have been very high because of special feature in construction?

A. The installation of small rolls consisted of five stands of 12″x20″ chilled iron rolls with a 75 h.p. variable speed individual motor drive. The only special feature was a wider range of speeds than is usual, 42 to 100 r.p.m.; in my opinion, of doubtful value.—W. J. Pettis.

Why Platers Turn Gray

A Foreman Plater's Experiences in Straightening Out Other People's Tangles

Written for The Metal Industry by PAUL KRAMARCIK Foreman Platers

I have traveled a lot and my reasons for doing so were to get experience and a record. Financially, I have not gained, but morally and educationally I have what is worth more than currency. I will give you the benefit of my experience, and the reasons why a foreman plater turns gray before his time. It is the conditions he finds that are left for him to straighten out. It is not always the cause of an incompetent executive in the department. Many times it is the fault of the management that such conditions exist. I have no axe to grind, so I am going to give you cold facts. The time is not far off when quality will be in demand as well as production of quantity.

A certain plating room in Connecticut of which I took charge had conditions which were bad; a sediment of six inches in the bottom of the nickel tanks; racks sticking in the mud (which put me in mind for digging for clams in Long Island Sound); a plating barrel in operation, holding a full sugar barrel full of work, wallowing in mud, giving no deposit at all. And still the work was passed. I asked the men when the barrels were cleaned last. The answer was, two weeks ago. I said, "How did you do it?" The answer was, "With a shovel." Now how can anyone clean a tank with a shovel without draining the solution off first? The copper was in fair condition, but the brass and bronze was in bad shape. The brass had a sediment of undissolved metal at the bottom. For 29 months I ran the solution every day by careful addition of cyanide and bisulphite without adding any metal after that time except copper. Some months later I asked for barrels to clean the solution. The answer was that they had never done this before, but I did get them after a lot of talking. The following year we cleaned again as we had some sediments in the still tanks which was mostly due to impurity of chemicals and low grade anodes. But the next two years we did not drain the tanks, but just keep the anodes cleaned and before leaving, inspecting them. We found only a slight trace of oxide of iron at the bottom of the still tanks. That is the result of careful addition of chemicals.

Salts should not be put in bags and then hung in the solution over night and on Sundays, but must be dissolved. How can one expect to get any benefit by taking, for instance, nickel sulphate and boric acid, put them into a bag and hanging in a cold solution? No conscientious foreman will do this.

Now let us go to Chicago. I received a wire to come to Chicago at once; a splendid position was open for me. Another crime committed. New equipment, nickel, copper, brass, silver, and gold—and everything on the blink. The anode surface in the silver strike was seventy-five per cent larger than in the silver tank; the bottom full of chloride of silver. After getting this into shape I received a call from another concern to come at once. New anodes in nickel were no good; they wouldn't work. I looked at the solution which had a specific gravity of 8½ Baume; pretty high for a double salt solution. After taking a glass of it, I knew at once that no metal was in the solution. I asked the man in charge of the department when he replenished it last. "Why," he said, "What do you mean?" He didn't think about putting salts into it as long as he had new anodes; he only added acid to it. How can anyone get a deposit with only one-half ounce of metal in a tank? Also, why did the manager put up with it for nine months?

Well, now let us take a train to Milwaukee, Wis., which is still in my memory. I found the department in excellent shape; nothing to do but continue, with the exception of one hot copper and one zinc tank. This department was run by a capable assistant foreman for six months before my arrival. I would have liked to have stayed in Wisconsin, but illness in my family forced me to make a change. Getting along in years myself, I am ready to settle down for a permanent home.

Now back to the southern part of New York State. Of all the messes, there was one of the best. Tons of work to do over again; solutions all dead; work sticking in the mud and the place in an awfully dirty condition. They kept work in the tank for two hours and got only a slight deposit; not enough anodes. I asked for twenty of them, but received only ten. A most interesting place to work; a lot of coloring, but nothing to do it with. There were six plating barrels, four nickel tanks, one copper and two zinc, and only one 75 gallon water rinsing tank. I also received a letter from the manager one day about having water running out of the overflow in the tank which looked wasteful to him. I finally got the place cleaned up in fairly good shape, receiving a lot of work. I was working the department 24 hours per day, and asked for two more tanks to cut out night work, but nothing doing. Now they are building another plating room to take care of the work. One isn't enough where two tanks would have done just as well, but after the horse is gone they shut the barn door. The condition would drive a saint to swear.

I got a position in the state of New Jersey. Another case of hard luck with the concern. They had had about seven or eight foremen platers in a short time. None would answer the purpose. Why, I don't know, but I can guess. I expected a hard case after so many changes. Everyone has his own way about solutions. I also have my own way. Some more dirty tanks to clean; chemicals put into solution without dissolving them properly. But the hardest proposition was the brass solution; a gravity of 18 Baume, poor in cyanide. I tried cyanide and bisulphite, not having the time to concentrate my mind on one trouble alone because it was the last month of the year, and I had a contract to close. The polishing, buffing and lacquering department was in very bad shape, like running a race with only one leg. Finally I had to get at the brass. I had no way to make a titration, so back to the old way to find the trouble. After manipulating the current by increasing it you will find your anodes get black; reducing it, they will brighten at once. It is a sure shot to know there is no metal in your solution. I added 3 ounces of cyanide of copper and 1 ounce of cyanide zinc, used only about one-third of the solution. I mixed the copper and zinc by heating them and adding enough sodium cyanide to clear it, and then added the rest of the solution. It worked fine. Now I am adding

nothing but cyanide of copper and sodium cyanide in equal weights every week and leave it to the men to run and have no more trouble with it.

The use of one ounce of Rochelle salts per gallon will be of benefit to a brass solution. It has a good effect on the anodes and has no effect on the color. I have used bisulphite often, but it is apt to make a change in the color. As far as a formula for brass is concerned, there is no rule. It all depends upon the skill of the plater. I do not believe in ammonia or ammonium chloride; also an excess of sodium cyanide will cause spotting out. I go by this standard:

Water	1	gallon
Copper Cyanide	3½	ounces
Zinc Cyanide	1	ounce
Sodium Cyanide	5	ounces
Soda Ash	¼	ounce
Rochelle Salts	1	ounce

Anodes 80% copper and 20% zinc.

Manufacturing concerns will insist on employing cheap platers, regardless of the amount of chemicals going into the sewer. One case came to my attention only four weeks ago when a certain plater ran one tank of solution in the sewer three times in two weeks. We all have to learn and work hard and I am not blaming any concern for getting a man at a low figure. There are probably not enough good platers to fill the demand, but why don't they join, or why doesn't the employer force them, to join the American Electro-Platers' Society? Their meetings are for educational purposes and you will find the old plater with experience always ready to give him his hard-won knowledge to other members.

A "NICKEL" ANODE

The illustration shows a piece of nickel anode. The concern which made such an anode should be put into jail.

The Spotting Out Problem

Suggestions for Reducing This Difficult Problem to a Minimum

Written for The Metal Industry by CHARLES H. PROCTOR, Plating-Chemical Editor

Spotting out usually develops from June to September and is a distressing problem to platers especially to those who must deposit copper, bronze or brass from cyanide solutions upon any of the commercial metals whether die castings, zinc, steel or malleable and gray iron. Even cast brass, and in many instances, sheet brass is susceptible to the disease as we might term it. Nickel and silver deposits cause but little trouble due to spotting out unless sulphur combinations are used for oxidizing upon silver. Then the same precautionary measures must be applied as with copper, bronze, brass or oxidized finishes applied to such deposits.

First. The free cyanide contents of all cyanide plating solutions should be kept down to the minimum. It is advisable to make minute additions each day, preferably at the close of the day's work, instead of carrying an excess to last several days or a week.

Second. In brass plating eliminate, if possible, the use of ammonia water, and use instead small amounts of caustic potash to keep the brass anodes free from zinc oxide and hold the zinc cyanide in solution. Amounts of ⅛ ounce or less per gallon of solution will be ample at one time. In copper plating avoid an excess of sodium hyposulphite. Small amounts of bisulphite soda or sodium bicarbonate are of advantage in copper solutions, the copper being maintained in the cuprous condition, instead of cupric. Furthermore the use of bisulphite of soda in the summer time enables the plater to maintain a lower free cyanide content in his copper or brass solutions.

Third. Wash thoroughly all plated deposits in cold and boiling water and repeat. The expansion and contraction of the metal under the influence of heat and cold will help to force the plating solution which is diluted by the rinsing water, from the pores and pin holes.

Fourth. The use of about two zinc anodes in the hot water tank with an addition of 1/16 to ⅛ ozs. of phosphoric or acetic acid maintains a slight acidity which reacting upon the zinc liberates hydrogen which later helps in preventing the formation of oxides.

Fifth. After plated or oxidized articles have been washed thoroughly as outlined, then dry out at 212° F. if possible. The heat evaporates the moisture and thus prevents water spotting under the lacquer.

Sixth. It should be remembered that if only heat is used in trying to eliminate spotting out, only the water is evaporated; the solids remaining behind unless eliminated by thorough washing. The solid, i.e., the materials contained in the plating solution, when not washed out of the pores and pin holes of the base metal, absorb moisture in a humid atmosphere, the pores filling and overflowing, giving a greater spot than the actual dimensions of pin holes or pores.

Seventh. Many firms are now using as a basis the so-called water dip lacquer followed when hard and dry by the regular spray or brush lacquer. The articles are placed in the water dip lacquer at a temperature of not less than 120° F. The contraction of the metal draws the lacquer into the pin holes and pores and practically plugs them up. The solids that remain in the pores such as cyanides and metal salts, especially when they absorb moisture and possibly form ammonia have a reducing action upon the cellulose lacquers. Whenever black spots occur due to spotting out it is found that the lacquer invariably has been reduced. As a proof of the dissolving action of such a combination, experiments will show that gun cotton, or nitrocellulose is soluble in a solution of carbonate of copper, ammonia hydrate and water.

The paint slogan "Save the Surface and You Save All" is applicable to plated surfaces during the humid weather of the summer.

Brazing Ferrules

Q.—I am enclosing sketch showing ferrules that I desire to make from sheet bronze and which I want to braze. Would you please inform me where I could get information on a brazing machine or method that would quickly and neatly braze the seams?

A.—By using the dip method of brazing on these ferrules, in place of the ordinary method, the work is immersed in the molten spelter until the parts are heated sufficiently to be united by it. This method is extensively employed in bicycle manufacture, as it is more economical for production work.—P. W. BLAIR.

Nickel on Wax Molds

Written for The Metal Industry by CHARLES H. PROCTOR, Chemical Plating Editor

Q.—Would you kindly give me information on the following. I made up a tank of 418 gallons of nickel solution for plating on wax molds; 2/3 double salt and 1/3 single salts; Baume 5½; pH 5.3; voltage 5-6; air agitation; temperature 90 F. I have varied my pH with ammonia as far as 6.8. I get my deposit very bright and inclined to be brittle on acid and alkaline sides. As my nickel types are curved or bent after the nickel copper shell is complete, the nickel has to be very flexible to stand the stretching without cracking. Would you think if I cut my voltage down to 4 volts and then reduced the resistance in bath by adding a conducting salt, say ammonium sulphate, it would soften the deposit without decreasing the speed and throwing power and its tensile strength? I have found in my experience with magnesium in my bath, that at times there is a sort of oxidation that takes place, especially if the nickel type (wax mold) is taken out for examination. A double shell is formed; nickel on top of nickel. Whether that is due to the pH being too high and not enough acid reaction, I am not sure, but the biggest problem to me is that if I work on the acid or alkaline side, I get very bright deposits; the only suggestion I could make is probably I am depositing iron in a metallic alloy with the nickel or probably an organic substance is in bath. In your experience have you ever tried tannic acid? Probably that would throw iron and organic substance down, such as resin or glue. I do not get time for experimenting, only rus, rush, rush, and the employers seem to think we ought to be a sort of an encyclopedia.

A.—We have read your letter with interest and advise as follows:

1. Reduce your voltage to below 4 volts. If you find that the internal resistance of the solution is too high to allow the decrease in voltage pressure, then add 1 oz. ammonium chloride; 1½ ounces will do no harm. You can readily determine the change in amperage by decreased voltage or the increase under the same voltage when ammonium chloride is added. Avoid adding ammonia. It is possible that its addition results in the bright brittle nickel deposit you make mention of. Very minute amounts of magnesium carbonate will be a better factor, not more than 1/64 oz. per gallon at any one time. It will neutralize the free acid forming magnesium sulphate and incidentally carbonic acid gas. For this reason it is safer to use than ammonia.

In our opinion it will be advisable to maintain the pH slightly lower, or a slight increase in free acid. We do not believe the iron produces brittleness of the nickel deposit. We do believe that hydrogen gas occluded in the deposit is the cause of the brittleness. We suggest that 75% acetic acid be used as the acidulating factor, and increase the acidity. As a rule free acid in the correct proportions will produce a malleable nickel deposit. Tannic acid cannot be used to any advantage in nickel solutions. It is possible that sodium perborate which is a hydrogen controlling factor will produce a more malleable nickel deposit. Try the addition of ⅛ oz. per gallon of solution, dissolved in as little hot water as possible, to produce a clear solution; then add just sufficient muriatic acid to the solution so that the acidity will equal the nickel solution. You can double the amount if you find its addition is advantageous. Sodium perborate precipitates the iron in a nickel solution and forms H_2O with the hydrogen, so is absolutely harmless. The non-adherence of the nicked deposit to the underlying nickel deposit when the articles are removed from the nickel plating solution for observation denotes oxidation of the nickeled surface, possibly due to ammonia in excess in the solution.

Future Trends in Electrochemistry

Electrochemistry is a field of applied science, which now includes not only electrolysis and the production of current by batteries, but also corrosion, electrothermics, and electrical discharge in gases. As an applied science it rests upon the fundamental principles of physics and chemistry. Real progress will, therefore, depend upon the extent of the advances in and application of our knowledge of atomic physics, through which alone can electrode processes such as polarization and overvoltage be understood. There should, therefore, be a closer connection between the electrochemists, and the physicists and physical chemists.

In the electrode position, including electrorefining, electrowinning, electroplating and electroforming, more attention has been paid in the past to the purely chemical and especially the analytical side than to the physical and electrochemical principles. More consideration of potential relations will probably result in improvements in even such well established processes as copper and nickel refining. In electroplating there is a need for a closer and more cordial cooperation between platers and chemists in industrial plants, especially in the development of new processes such as chromium plating. Industrial success depends on sound scientific principles, sound engineering, and sound economics, for the first of which the chemist is mainly responsible.—Dr. W. Blum.*

* Abstract of a paper presented before the Division of Industrial and Engineering Chemistry at Semi-Centennial Meeting of the American Chemical Society, Philadelphia, Pa., September 6-11, 1926.

Future Developments in Light Metals

Aluminum and magnesium are the only light metals which, by virtue of their uses for structural purposes, seem to face a largely increasing demand in the near future. Other light metals have only limited uses; chiefly as reagents in special chemical processes. The solution of the problems involved in the fabrication of the magnesium-rich alloys is rapidly extending their use in aviation and similar fields where extreme lightness is of the greatest importance, and cost is a relatively minor consideration. The high strength aluminum alloys on the other hand are finding their place in competition with brass and steel, especially in all parts of the transportation field. The author predicts a rapidly increasing use of sheet, castings, forgings and structural shapes of these alloys, which have the strength of mild steel and only a third of its weight. Much of the practical development work along these lines has been done and is being done in America.—Dr. F. C. Frary.*

Corrections

In our August issue, page 324, mention was made of a brass solution which stood at 181 Baumé. This should have been 18 Baumé.

On page 335 in Shop Problem 3,551 of the same issue, it was stated that nickel chloride could be made by dissolving cadmium in muriatic acid. This should have been cadmium chloride.

Chromium Plating Progress

A Summary of the Developments on the Electro-Deposition of Chromium Up to the Present Time. A Paper Read at the Annual Convention of the American Electro-Platers' Society in Newark, N. J., June 28-July 1, 1926

By PAUL W. C. STRAUSSER, Detroit, Mich.

HISTORY

The electro-deposition of Chrome dates back as far as 1854, when R. Bunsen demonstrated that fair deposits could be obtained. Heretofore, Chromium was deposited electrolytically from a hot solution of Chromium Chloride and Hydrochloric acid, but resulted in a form of a granular powder. Since then the metal has been deposited from solutions of various concentrations of Chromic Acid and Chromium Sulphate and water. Since that time several patents have been issued, such as the Placet-Bonnet, F. Salzer, G. J. Sargent, and many others. F. Forster claims to have obtained good results from a mixture of Chromic Acid and Chromium Chloride together with a content of free Sulphuric Acid.

In many of the formulas suggested since R. Bunsen's time, while giving satisfactory results, many variables were still to be overcome to insure sufficient confidence from the manufacturers, especially the automotive industry, to justify the expenditure of many thousands of dollars for equipping their plants for its commercial use.

Sufficient interest has been aroused in the past three or four years that many plants throughout the country claim to have overcome these variables by which they can now proceed with the assurance that the money will be well worth the effort.

There are at the present time quite a few concerns that are attempting to Chrome plate on a commercial scale. Some claim to have invented an electrolyte formula, also the process of its electro-deposition, that is "fool proof"; that is, a bath and process constituted so that the plater may feel assured that his work at the time of removing same from the bath will not be found in such a condition as to make it unfit for the purpose for which it is supposed to be used. Many of these formulas have been investigated by the writer, and he regrets to state that not one possessed that most important factor of "throwing power" without the use of auxiliary anodes on recessed objects. Chromium is a very electro-positive metal as found by W. Muthmann and F. Fraunberger, the potential of Chromium against a normal Potassium Chloride (KCl) solution to be at least +0.63 volts, and may, therefore, be capable of affording protection to iron from rusting.

The industry, as a whole, owe their gratitude for the foresightedness and patience given by J. B. Dailey, formerly Director of the General Motors Laboratory of Detroit. This gentleman can be credited for rejuvenating the lost interest in the art of Chrome plating by providing an experimental electro-plating laboratory in the metallurgical section, assigning Messrs. Mann, Case, Phillips, and the writer to experiment. This laboratory was started in the fall of 1924. Mr. Dailey's interest in Chrome plating was aroused when he was approached by a representative of a German manufacturer who tried to dispose of a method of Chrome plating for $250,000 which he had demonstrated by submitting samples to a General Motors official. This laboratory justified its means, as it was here that the possibility of Chrome plating radiators was developed.

EXPERIMENTAL WORK AND RESULTS

It is the chief purpose of this paper to present the laboratory results as found by the writer and his colleagues, so that with the hearty co-operation of the practical men engaged in the art of electro-deposition of metals, they may benefit thereby.

Chromic Acid, CrO_3, 98% plus, Chromium Sulphate, $Cr_2(SO_4)_3 \times 5\ H_2O$ and Boric Acid, H_2BO_3, was used in various percentages as follows:

Chromic Acid, CrO_3 ..... 150 to 300 grams per liter
Chromium Sulphate $Cr_2(SO_4)_3 \times H_2O$ 1 to 40 grams per liter
Boric Acid, H_2BO_2 ..... 1 to 15 grams per liter

The anodes used consisted of Lead, Carbon, and Steel (low carbon sheet steel). Of the many percentages of the ingredients used as specified above, the one which was found most favorable consisted of the following:

Chromic Acid, CrO_3 ..... 200 grams per liter (scales)
Chromium Sulphate $Cr_2(SO_4)_3$ ... 5 grams per liter
Boric Acid, H_3BO_3 ..... 3 grams per liter

Of the three different types of anodes used, steel was found to be the most satisfactory. After working the Chromic Acid bath for several months with steel anodes, a careful analysis was made on the iron content with the result that mere traces were found; this amount no doubt was present in the chemicals used in making up the bath. The baths were made up in a two liter beaker, assuring the proper spacing between the anodes and the object (cathode). The anodes (steel) were 6″x1″. One anode was used on each side of the cathode.

The writer will now describe as briefly as possible in tabular form the results obtained using various base metals as the objects to be plated. The cathode samples were 6″x1″, three inches of which was submerged in the bath or an area of six square inches. All samples were cleaned without the current in a boiling solution of a tri-sodium phosphate base cleaner. Distance between anodes and cathode—four inches.

CHROME PLATED STEEL STRIPS

Sample Number	Temp. Deg. C.	Amp. Sq. Ft.	Volts	Time in bath, Minutes	Condition of Deposit
1	19	100	3.6	4	Dark Gray.
2	30	100	3.5	4	Improvement in luster.
3	41	100	3.3	4	Light gray.
4	45	100	3.6	4	Brightening up.
5	51	100	3.6	4	Very good deposit.
6	57	100	3.3	4	Very good deposit.
7	62	100	3.2	4	Satin finish.
8	23	200	4.0	4	Dark gray.
9	31	200	4.0	4	Light gray.
10	44	200	3.8	4	Light gray.
11	51	200	3.8	4	Indications of brightening.
12	59	200	3.6	4	Very good deposit.
13	66	200	3.6	4	Satin finish.
14	25	400	4.9	4	Dark gray.
15	35	400	5.4	4	Still dark gray.
16	47	400	5.4	4	Light gray.
17	55	400	4.5	4	Indications of brightening.
18	64	400	4.6	4	Very good.
19	70	400	4.4	4	Satin finish.

CHROME PLATED COPPER STRIPS

Sample Number	Temp. Deg. C.	Amp. Sq. Ft.	Time in bath, Volts	Minutes	Condition of Deposit
20	19	100	3.6	4	Dark gray along edges, otherwise O.K. (Bright in center of strip.)
21	32	100	3.6	4	Very good.
22	43	100	3.3	4	Surface not completely coated.
23	50	100	3.3	4	Less coating than No. 22.
24	60	100	3.3	4	Less coating than No. 23.
25	20	200	4.1	4	Satin finish.
26	34	200	4.2	4	Bright, although darkening along edges.
27	43	200	4.0	4	Very good deposit.
28	50	200	3.7	4	Very good deposit.
29	62	200	4.0	4	Surface not completely coated.
30	20	400	5.2	4	Light gray.
31	35	400	5.0	4	Dull along edge, bright otherwise.
32	43	400	5.0	4	Dull along edge otherwise very bright.
33	50	400	4.9	4	Satin finish along sides, bright in center of strip.
34	61	400	4.7	4	Satin like finish.

CHROME PLATE ON NICKEL PLATED STEEL STRIPS

Sample Number	Temp. Deg. C.	Amp. Sq. Ft.	Time in bath, Volts	Minutes	Condition of Deposit
35	17	100	3.8	4	Dull along edge, otherwise bright.
36	33	100	3.6	4	Very good deposit.
37	43	100	3.4	4	Very good deposit.
38	50	100	3.4	4	Very good deposit.
39	64	200	3.2	4	Bright, although not completely coated.
40	17	200	4.2	4	Light gray.
41	34	200	4.1	4	Bright, peeling along edge.
42	43	200	4.0	4	Bright, peeling along edge.
43	52	200	3.8	4	Satin finish, peeling along edges of strip.
44	64	400	3.6	4	Satin like finish.
45	19	400	5.6	4	Light gray.
46	35	400	5.2	4	Excessive peeling.
47	43	400	5.0	4	Excessive peeling.
48	53	400	5.0	4	Excessive peeling.
49	64	400	4.8	4	Very good deposit.
50	72	400	4.4	4	Very good deposit.

CATHODE EFFICIENCY, USING COPPER STRIPS

Sample Number	Amp. sq. ft.	Volts	Temp. Deg. C.	Time	Wt. of deposit grams	Condition of Deposit
51	100	3.8	15–19	1 hr.	.41	Gray.
52	100	3.8	30	1 hr.	.21	Shaded along edge, otherwise bright.
53	100	3.8	40	1 hr.	.20	Very good deposit, slight shaded along lower edge.
54	100	3.8	50	1 hr.	.14	Very good deposit.
55	100	3.8	64	1 hr.	.10	Surface not completely coated.
56	200	4.7	24	1 hr.	.88	Dark gray.
57	200	4.8	34	1 hr.	.61	Light gray.
58	200	4.4	44	1 hr.	.55	Satin finish.
59	200	4.2	50	1 hr.	.45	Very good.
60	200	4.2	62	1 hr.	.40	Semi-lustrous finish.

It will be noted that from the experiments outlined above, the condition of the deposits on the three different base metals varies in nearly every case with respect to temperature and current density (C.D.) used. It would appear from the results of these tests that the commercial plater would be forced to use caution if he is expected to obtain consistent results.

The content of the Chromium Sulphate, $Cr_2(SO_4)_3$ over 15 grams per liter gave a cracked, peeling condition of the Chrome deposit. An excessive amount of Boric Acid does not better this condition, but its presence seemed to be very essential. It is the writer's opinion that the presence of Boric Acid does not function in the way of preventing a brown film on the object, but seems to aid materially in the reduction of a constant supply of trivalent chromium ions. Most of us, who are familiar with the descriptions of various chromium baths as published in recent articles, know that the presence of Chromium Sulphate provides the medium through which the Chromium is plated, the Chromic Acid acting as the reservoir.

Many objects have been plated from the formula as suggested in this paper, such as wrist pins, water pump-shafts, medallions, and motor valves. The amount of deposition at 100 amperes per square foot at 45° Centrigrade for one hour's plating never exceeded .0003 inches in thickness. While it is a known fact that the rate of deposition is higher at lower temperatures using the same current density (C.D.), an objection is made plating at these lower temperatures due to the fact that more hydrogen is bound by the Chromium deposits, and consequently the deposits become correspondingly brittle.

A not unimportant property of deposited Chromium is its capacity to "occlude" gases. In this it resembles both Nickel and Iron. Garveth and Curry state that the metal can occlude 250 times its own volume of hydrogen, this taking place more readily at lower plating temperatures. It is, therefore, more desirable to operate the bath at higher temperature, namely, 45° to 60° Centigrade. It is quite difficult to plate on brass at the higher temperature, especially on an unbuffed brass surface, this being due to some factor which is under investigation. It has been demonstrated that a closer grain is obtained at the higher temperature, using the same current density (C.D.) (especially in an agitated bath) at the sacrifice of cathode efficiency. The gray matter which is produced at lower temperature may be buffed. Past experience has taught us that the ordinary polishing compos make no impression whatever upon it. The most satisfactory abrasive at the present time is known as "Green Chrome Compo," or something similar which can now be obtained from several plating supply houses who make somewhat of a specialty on this kind of an abrasive.

ANODES

Since an insoluble anode has been the type employed up to the present, metal (Chromium) must be supplied to the solution by way of addition of metal containing salts. Such means of supply too often invites trouble in a plating process, and it is, therefore, the writer's opinion that the anode side of the Chromium bath should be more fully studied.

CURRENT DENSITIES

Current densities of 300 amperes per square foot have been used for six hours in an agitated solution. The condition of the deposit at the end of that period was of a lustrous finish. The sample in this case was a piston pin and the thickness of .0045" was obtained. The plate was very hard, and could not be machined even when using a diamond cutter. Much higher current densities were used, namely, 700 and even as high as 800 amperes, one square foot, for two minutes. The bath in this case was violently agitated, and, strange to say, the expected did not happen; that is, the deposit was not burnt or peeled, a bright deposit having been obtained. Of course, this would be rather impossible on a commercial scale. This specimen happened to be a motor valve, and the writer endeavored to strike the head of the valve overall without using auxiliary anodes.

DISCUSSION AND SUMMARY

Chromium plating is of widely increasing importance because of its many advantages over other types of metallic coatings, some of which are:

Extreme hardness.
Resistance to most acids and alkalies.
Resistance to mechanical wear, abrasion, and friction.
High reflective power.
Under certain conditions, the Chromium plate is bright and requires no polishing.
Resistance to rust and tarnish.
Does not oxodize, only at high temperatures.

There is a broad field for Chrome plating such articles as motor wrist pins, water pump shafts, tappets, and a number of parts now being carbonized. Hardness would be the prime factor in this case. It also would eliminate the corrosive action of the Sulphur gases on the wrist pin surfaces, causing pits. The writer knows of several cases where the wrist pins had been plated with .001 inches of Chrome directly on the steel base material (the pin having had no previous case hardening treatment), and then placed into service for three months, at the end of which time the plate showed no wear, having remained intact during that time.

Head light rims, radiator shells, and numerous other parts exposed to the weather may either be plated direct or flashed over a bright nickel surface. The dirt accumulating on the object now and then may be removed by using a damp rag, thereby restoring its original bright luster.

The fact must not be lost sight of that in Chrome flashing over a nickel surface, the base metal being steel, the thickness of the primary metallic coats of copper and nickel must not be sacrificed, as a Chromium plate may actually accelerate corrosion where the deposits of copper and nickel are broken or porous. The writer knows this to be an actual fact by observing experimental radiator shells that have been out in service.

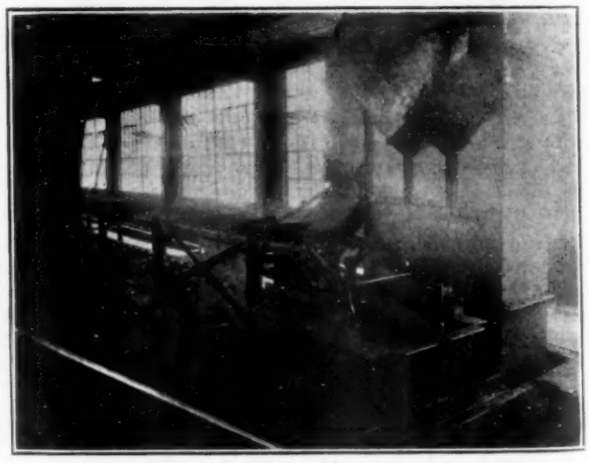
Those undertaking the process of Chrome plating as merely flashing over Nickel, may find that it will throw better over Nickel, than Steel, Copper, or Brass. The successful plating of Chrome on brass or copper, especially on recessed parts, may be struck with a rather high initial current, and then dropping down to normal plating conditions.

In conclusion, it is the writer's opinion that Chromium plating will not entirely displace nickel plating, but rather be a great aid in prolonging the life of plated parts as regards the wearing qualities and resistance to corrosion, especially when flashed over nickel plate.

U. S. Aluminum Company Coal Handling Plant

Shortly after the installation of the steam heating plant at the Harvard Avenue plant of the United States Aluminum Company, at Cleveland, Ohio, it was inspected by a committee of engineers from a neighboring chemical factory who had been visiting a number of plants in Ohio preparatory to deciding upon the most suitable and efficient central steam heating system for their own works. The plant made an excellent impression.

VIEW OF BOILER ROOM



VIEW OF HORIZONTAL CONVEYOR

The Harvard Avenue plant is part of the Castings Division of the United States Aluminum Company. It consists of a number of separate buildings, thus making a centralized steam heating plant the logical solution. The two 250 horsepower boilers are of the Babcock and Wilcox sectional water-tube type. They are fed by mechanical stokers from chutes leading down from a large parabolic section steel bunker which runs the entire length of the room above and in front of the boilers. The bunker has a total capacity of approximately 250 tons and the coal and ashes are handled as follows:

The coal cars are brought to the outside of the building on a spur-track, and the coal is dumped into a hopper below the track. Thence it is carried by a short Sterns conveyor to the crusher which reduces it to the requisite fineness. It then drops into the boot of an enclosed type Sterns bucket elevator, and is raised to the Stearns scraper conveyor above the coal bunker. By means of gates distributed along the conveyor trough, the coal is dropped into any desired part of the bunker.

The ashes are taken from the ash-pits by wheelbarrow and are dumped through a grating in the floor into a Stearns enclosed type bucket elevator. From the top of this elevator it is spouted into a storage ash-hopper placed on a structural steel tower above the spur-track. From this point the ashes are dumped at convenient intervals into the cars below.

The whole of the above coal and ash-handling equipment, with the exception of the structural steel work of the tower, was supplied and installed by the Stearns Conveyor Company, Cleveland, Ohio.

In addition to the regular heating system, this plant also supplies steam at high pressure for heat-treating castings and forgings.

Health Hazards of Brass Foundries

Field Investigations of the Health Hazards of the Brass Foundry Industry *

By Dr. J. A. TURNER and Dr. L. R. THOMPSON

The data presented in this section were obtained from surveys made in both large and small and both modern and old-fashioned foundries, typical of the trade at the present time. Some of the foundries visited were conducted in conjunction with iron foundries, which make some of the parts that are essential to complete the products manufactured by the brass plants. Other foundries visited were known as jobbing plants, where small brass, bronze, and composition castings are the sole products turned out. All told, 22 foundries were visited. These plants employed approximately 340 men at the time during which the study was made.

The following conditions which have, directly or indirectly, a detrimental influence upon the health and efficiency of workers were observed to be present in the foundries visited: Exposure to dust; inadequate illumination and glare; inadequate ventilation; the presence of fumes, gases, smoke, heat, cold, dampness; and in some instances inadequate personal service facilities.

ILLUMINATION

Inadequate illumination increases liability to accidents and to eyestrain, with its subsequent effect upon vision. Natural illumination was obtained, in the foundries visited, by means of windows, skylights, and doorways.

Since windows serve the dual purpose of admitting light and supplying fresh air, the type of window used and the maximum opening area of these outlets must be considered.

The skylights, like the windows, serve the dual purpose of admitting light and providing ventilation. Therefore, their efficiency depends upon their size, their location, and ther intelligent operation.

VENTILATION

An artificial ventilating system adequate for the rapid removal of zinc fumes is of utmost importance in a brass foundry, because, if inhaled in sufficient quantity, the zinc oxide which escapes into the workroom is capable of producing the phenomenon called "brass foundrymen's ague"; and moreover, carbon monoxide, sulphur dioxide, smoke, and suspended dust are sometimes present in the atmosphere of a foundry.

The natural means of ventilating the foundries visited were the openings provided by windows, skylights, roof ventilators, and doors. That the natural means were insufficient in certain cases was indicated by the histories obtained from the workmen, who suffered from attacks of brass foundrymen's ague, particularly during the winter months, when windows, doors, and skylights are most apt to be kept closed. Windows, doors, and skylights do not completely and effectually remove the zinc fumes in many foundries, because they are not placed in proper relation to the source of the fumes, and because of the interference of cross currents and insufficiency of draft. Fumes should be removed at their sources, before they come in contact with the workers' faces.

The hoods located over the Swartz furnaces were found, in most instances, to be too small to collect all the zinc fumes, especially when the furnaces were tilted in order to pour the alloy. In one plant visited, it was noted that the stacks of the hoods did not rise above the adjoining buildings, and that considerable portions of the fumes were blown back into the foundry through the open skylights.

In the plants that use the pit furnaces, there was no danger from fumes luring the melting of the alloy, since they escaped up the chimney; but when the crucibles were removed, there were no hoods to carry off the dense white clouds of zinc oxide which were immediately formed.

In three of the foundries visited, artificial ventilating systems of different types were seen. These were inadquate, chiefly because of faulty size and placing and lack of proper control.

THE DUST HAZARDS OF FOUNDRY ROOMS

The greater portion of the dust in the foundry rooms comes from sand during its preparation for molding purposes, and during the process of knocking out the castings from the flasks. A considerable quantity of dry sand also accumulates upon the floor and is stirred up by the men's feet as they handle the flasks and the various materials.

The metallic dusts present in the foundry rooms are formed chiefly during the melting and casting processes and the cleaning processes, when these are conducted in the same room. The usual metallic dusts found are cadmium oxide, copper, manganese, iron, antimony, tin, and lead dusts. Zinc oxide, present at all times in the atmosphere of the foundries but in enormous quantities during the casting, is of particular interest from the standpoint of its effect upon the workmen. In addition, there are the "parting" dusts, which are usually trade products and are reputed to contain, either singly or in combination, ground bone, lycopodium, flour, sand, fuller's earth, graphite, and lampblack. These parting dusts are put into small sacks and sifted over the opposing surfaces of the molds; during the sifting, some of the light dust rises to the faces of the workers and is inhaled by them. The workmen appeared to be under the impression that the parting dusts were harmful, and some of the workers complained that they caused an irritation of the nose and throat, producing a hacking cough. They said that they were constantly expectorating stained sputum; some of them add that they were able to raise dust-stained sputum even when they had been absent from the plant for a week or two, particularly if graphite or lampblack parting dusts had been used.

ZINC FUME HAZARD OF THE MOLDING ROOM

Fumes are evolved in the molding room during the melting and pouring of the alloy. In the former operation the greater portion of the fumes escapes up the furnace flue, but a certain portion may escape into the workroom because of back drafts in the chimney, or because the hoods are not large enough.

During these processes dense white clouds, composed chiefly of zinc oxide, escaped from the crucibles and ladles. These fumes rose rapidly to the ceiling, and unless a

*Abstracted from Public Health Bulletin No. 157, U. S. Public Health Service. Complete copies can be obtained from the Superintendent of Documents, Washington, D. C., price 20c.

[1] Compare Public Health Bulletin No. 116, Lead Poisoning in the Pottery Trades, by Bernard J. Newman, William J. McConnell, Octavius M. Spencer, and Frank M. Phillips, p. 116, for the results of further studies.

sufficient exit was provided for them there, were disseminated throughout the room. The ladle carriers, especially the rear men on the bull ladies, or crucibles, were more directly exposed than the other workers. So far as observed covers were not provided for the ladles in any of the plants which were visited.

Weather conditions may influence the fume hazard somewhat, for during the inclement weather the water saturation of the air is increased so as to interfere to some extent with the escape of the fumes from the room. The fumes that are evolved during the pouring process are chiefly of zinc oxide, although other metals—antimony, manganese, iron, cadmium, tin, and lead—were found in samples of air that were analyzed.

HEAT AND COLD HAZARDS OF THE MOLDING ROOM

During the pouring of the molten metal, the temperature of the molding room is elevated but little above its normal rate. The health hazard during the period of this work does not result from the slight elevation of the temperature, but from the increase of activity. The men perspire freely, and often go outdoors to cool off, or perhaps to their homes in sweat-soaked clothes.

In the plants visited, there were noted at least four methods of heating the foundries during the winter months—the use of iron stoves, open salamanders, steam, and the plenum system. It was found that a comfortable working temperature could be maintained in the small shops which used stoves. The chief objection to the salamanders is the lack of hoods for the removal of dangerous gases. Steam heating appears to be a satisfactory system, in that its use eliminates the possibility of contaminating the atmosphere with gases and smoke, and insures an even temperature throughout the room. The plenum system has the admirable advantage that during the summer months it may be used to supply the workroom with cool air.

HEALTH HAZARDS OF CORE ROOM

The health hazards of core rooms arise from inadequate illumination and ventilation, from heat, dust, and fumes, and occasionally from the core binder, the latter sometimes causing a skin eruption in susceptible individuals.

The amount of the fumes and gases that escape from the core-ovens depends upon the presence or absence of hoods for their removal. The SO_2, CO, and CO_2 gases which are formed during the drying of the cores emanate from the organic substances in the core binder and from such organic material as may be present in the sand.

The heat hazard of this department depends upon the size and type of the core ovens used. If these ovens are large, the workmen are compelled to go inside them, in order to place and later to remove the cores, at times when the oven temperature may range from 120 deg. to 180 deg. F. This job takes from 5 to 20 minutes, and is usually repeated from seven to nine times a day. In work like this the hazard is somewhat similar to that described in the molding room; that is, the workmen perspire freely and are apt to go outside to cool off, and to go home in sweat-damp cothes. In shops where small cores are made, the cores are placed on portable or hinge-type trays and are then put into the ovens without the workers' being subjected to an unduly high temperature. When the core-making process is carried on in the molding room, the number of workers exposed to the hazards is increased.

HEALTH HAZARDS OF THE CLEANING DEPARTMENT

The most serious hazard of the cleaning department consists in exposure to dust, which is chiefly siliceous in character, although metallic dust is also present, but in a relatively minor degree. The method employed in cleaning the castings is of importance from the health standpoint. For example, sand blasting is an extremely dusty process, and unless it is conducted in an inclosed sand-blasting chamber of the type that admits of the operator's remaining on the outside, the worker cannot work at the trade for more than a year or two without serious detriment to his health. In fact, some establishments make this time the maximum for employment of a worker at this process. The work of chipping the rough and uneven surfaces of castings exposes the worker to injury from metallic particles; these particles are usually much too large to be classed as dust, but they are capable of producing injuries to the body, and especially to the eyes. In breaking up the cores and cleaning them out of the castings, the workers are also exposed to siliceous dust.

In the grinding process, workers are exposed to both siliceous and metallic dust, in which particles from the grinding wheels themselves are often mingled. The cleaning of castings by the tumbling-barrel method is also attended by a dust hazard. As a rule, the grinding machines and the tumbling barrels are equipped with exhaust systems for the removal of the dust; but the effectiveness of these devices depends upon their regulation and upkeep. Usually it is only in the large and well-equipped establishments that the sand-blasting process is carried on in an inclosed compartment of the type which admits of the operator's remaining outside the chamber. In case the operator is not thus protected, he is often provided with a hood, of some one of the various types used for the purpose. Goggles for the employes of the cleaning department were seen in every plant visited; but it was also observed that the workers often neglected to us them.

PHYSICAL CONDITION OF BRASS FOUNDRY WORKERS

The most important and interesting health hazard of the brass-foundry trade is exposure to brass fumes, which produces that curious train of symptoms called brass foundrymen's ague.

In this survey, it has seemed important to study the physical condition of brass foundrymen who had been subject to attacks of ague, as compared with those who gave no such history, although working in the same occupation. To this end the following classification has been made:

Three groups of workers.—In all, 212 workers in brass foundries were examined. These have been classified into three groups, on the basis of a history of exposure to zinc oxide during the melting and pouring of brass. The first group consisted of 102 persons, or 48 per cent of the number examined, who were exposed to zinc oxide and gave histories of suffering from brass foundrymen's ague.

The second group consisted of 68 persons, or 32 per cent, who had a history of exposure to zinc oxide, but had not suffered from brass foundrymen's ague.

The third group consisted of 42 persons, or 20 per cent, who gave no history of being exposed to zinc-oxide fumes.

PERCENTAGE OF WORKERS OF DIFFERENT OCCUPATIONS WHO HAD BEEN AFFECTED BY ZINC OXIDE

	Number exposed	Number affected	Percentage affected
Molders	102	69	68
Molders' helpers	28	14	50
Melters	14	7	50
Core makers	5	3	60
Others	21	9	43
Total	170	102	60

THE METAL INDUSTRY

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Contents

EDITORIAL

FOUNDRYMEN'S CONVENTION

The coming convention of the American Foundrymen's Association in Detroit, to be held September 27-October 1 inclusive, will be one of the great conventions of that Association. In addition to the regular Foundrymen's program it will include the second International Foundrymen's Congress, with papers by foreign foundrymen of international reputation. Advance information points to the fact that the exhibits are likely to be the largest and most elaborate ever held.

To the metal trades, this meeting will be unusually important. There will be papers on aluminum alloys and permanent mold work. A symposium will be held on temperature determination in which foundrymen, metallurgists and pyrometer manufacturers will join. The round table discussion on Brass Foundry Topics is a fixture in the Foundrymen's programs and these discussions are always stimulating. Probably due to the fact that speeches are not reported in full, these meetings are less formal; discussions are more freely entered into and opinions are bluntly and openly expressed.

General topics which are nevertheless of great interest to the metal foundries, will include foundry costs, sand control, elimination of waste and apprentice training.

The progressive and forward-looking foundryman should make it his business to attend or send a capable representative, as the Foundrymen's Association meetings are the most important source of information on developments and advances in his work.

APPRENTICE TRAINING IN THE METAL TRADES

An important and fast growing movement in American industry, and in the metal trade particularly, is that of apprentice training. The last ten years have witnessed an unusual situation. With the increase of public "puffs" in the daily and periodical press of success in various forms there has been, as a result, a strong drift from manual labor to white collar jobs. As a matter of fact this drift was justified in many ways. Manual labor would lead to a trade with recurring periods of unemployment, whereas the white collar had all doors open to it—at least theoretically. The boy had the lure of the "executive job" and he figured, naturally, that he would rather be an executive than a foreman or even a superintendent.

Rightly or wrongly this resulted in the American-born youth turning away from the shops. So long as the shop positions could be filled by foreign-born labor this was not felt so badly, but since the immigration restrictions have been passed, the labor situation has become more acute and industry has had to cast about for a solution.

The apprentice training method which seems to be the most popular attempt to remedy this condition is briefly a revival of the old apprentice system but with greatly improved conditions and much more to offer to the apprentice than was formerly the case.

R. F. Carey, Supervisor of Education of the Westinghouse Electric and Manufacturing Company, South Philadelphia Works, presented a comprehensive paper on Apprentice Training in the Metal Trades, before the National Education Association. He showed that according to the 1920 census there should be 750,000 apprentices in America to fill the ranks in industry as they became depleted. As a matter of fact there are less than 150,000. The problem then is to offer sufficient inducement to boys to go into the shops to become mechanics and skilled workers.

The system of vocational education that is being planned for Philadelphia through the co-operation of the Philadelphia public schools with the Philadelphia Manufacturers' Association is briefly this. The metal-working establishments will take into their shops apprentices who will be trained as all-around mechanics. If this cannot be done in one shop then the boy will be circulated through a number of shops, sufficient to give him a well-rounded experience that he seeks and that he has the right to demand. Related theoretical instruction will be given at the public schools, presumably on Saturday morning. The boys will be paid by the employer for the time spent in the class-room at the same rate as if he were working productively in the shop, and attendance at these classes will be compulsory.

Opportunities for skilled men in the metal trades have increased enormously since the time when the drift away from the trades began. Fifteen years ago a good mechanic received from 36 to 46 cents per hour; now rates as high as 80 cents to $1.00 per hour are not unusual. Boys who have been through with the above-mentioned course for as short a time as three years, are in many cases, earning well over $2,000 a year and their average is only 23 years. Such boys are also excellent material for the position of foreman or superintendent. In the Westinghouse Company nearly all of the shop executives and many of the other executives are products of this system. From the point of view of the employer an outstanding advantage is that labor difficulties with this type of employee are at a minimum.

Mr. Carey collected some interesting figures on the progress made by apprentices in comparison with technical graduates. In 1921 there were over 196,000 manufacturing establishments each producing more than $5,000 worth of products per year, outside of automobile repair shops. These 196,000 firms employed almost 7,000,000 hands. There are only about 5,000 technical men graduated every year; a wholly insufficient number to supply leaders for the manufacturing capacity of this country. That is the opportunity for the apprentice. He is no longer to be an unnoticed cog in the machine but an individual with a future depending upon his own ability.

COPPER CONTROL

For the last four years the copper industry has been struggling to bring its production and consumptive demand into proper relationship. Before the war the copper industry ran on an even keel. The war however, increased the demands to such an extent that capacity, in order to keep up with it, outstripped normal consump-

tion to an extent that was undreamed of at the time. Enormous stocks of surplus copper were piled up almost unknowingly, and when the war ended, the world found itself with billions of pounds of copper ready to use for which there was a very much decreased market. As a result, production was cut and the surplus stocks gradually used up.

From 1919 to 1921 production of copper decreased, and although the consumption kept comfortably ahead of it, the surplus stocks hung heavily over the market. In 1922 the first increase of production was shown with promise of better conditions in the future. The result was over-confidence and in 1923 production again outstripped consumption. In 1924 there was another increase in both items but they were now almost together. In 1925, for the first time in three years consumption went markedly ahead of production, thus further depleting finished copper stocks. Statistics for 1926 are, of course, not yet out, but it is known that surplus stocks are at the lowest point in history, pointing to the fact that production is under good control and not out-stripping consumption.

It is obvious that this could not have been brought about without intelligent co-operation between the leading producers. If all the mines were to work at capacity the world would be again flooded with copper. It is only sound business sense to produce no more than the market will consume and that is what the copper industry has legitimately exercised. The copper producing business has always been directly at the mercy of a world market. There are large low cost producers in South America and in Africa which have been profitable in any market condition, no matter how low prices were. When prices were high these low cost producers reaped a harvest and a large number of small mines in the United States came into the field. The result was over-production. When prices were low, the small high cost producers of course, had to stop but the low cost producers not only kept on operating but increased their capacity, as they could meet market conditions and still show good profits. The result was almost chaos.

Since the time when this condition obtained the Anaconda Copper Mining Company bought control of the Chili Copper Company. Other South American producers were in American hands and as a result a balance was probably struck. There are few great copper producing centers in the world to-day in the hands of other than American capital excepting the Katanga mines in Africa and the Japanese producers. Consequently the conditions were more easily controlled especially with the existence in the field of one great factor, the Anaconda Company, similar to the United States Steel Company in the steel industry.

The future of the copper industry begins to look safer, sounder and consequently more encouraging. There will perhaps be no radical gains in prices but there will be steady operation at a reasonable rate and at fair prices. This is much more important and much healthier than large immediate profits as these are almost always followed by losses. The copper industry in comparison with industries is following the general trend of American business by keeping on an even keel and making progress slowly but surely.

BUREAU OF STANDARDS WORK ON PLATING

At the Newark meeting of the American Electro-Platers' Society, Dr. William Blum gave a short talk on the progress of the research work undertaken by the Bureau of Standards. It is unnecessary for us to repeat the universal praise of this work, but simply as a matter of information, we wish to list the different fields in which investigation is being carried on and to advise our readers as strongly as possible to watch for reports of these investigations.

The policy of the Bureau is to stick to fundamental problems. In other words their function is not to undertake the solution of a difficulty encountered by a particular plant but to study subjects which will have a wide application and can be used by a large number of plating shops. The problems at present under investigation by the Bureau are as follows.

1. Polarization (which governs throwing power and the character of the deposit).
2. Chromium plating.
3. Acid zinc solutions.
4. Electrotyping.
5. Specifications for silver plating.

In this list of projects there is something which should interest every electro-plater and manufacturer of electroplated products.

ILLUMINATION AND DAYLIGHT

The meeting of the Illuminating Engineering Society held in New York, September 7-10, 1926, includes some papers which will interest every foundryman. The question of lighting, while of general interest, is no less important than the specific problems coming up in special trades. Everyone will admit that good light pays but strangely enough there are thousands of foundries in which the windows remain dirty, cutting off a good share of the light which costs nothing and forcing the operator to use electric light which is of course, anything but free.

A paper by Randall and Martin shows that the decrease in transmission of light is proportional to the lengths of exposure to dirt laden atmosphere and the slope of the glass. Sloping the glass to admit more light is useless unless the glass is kept clean. Other interesting points brought out were:

1. After a period of 4 months with the windows uncleaned, the amount of light which they would transmit was only 25 to 50 per cent of that for clean windows.
2. The rate of decrease in transmitting power was greatest when the windows had just been cleaned.
3. About 75% of the decrease in transmitting power was due to dirt on the inside of the window.
4. The type of grass used made comparatively little difference in the amount of dirt collected.

The authors of the paper recommend that, in case a yearly schedule for cleaning is maintained, the cleaning should be done in the fall so as to let in the minimum amount of light during the winter months when it is most needed.

They also advise a frequent schedule of cleaning the inside of the windows with a damp cloth as a very effective and inexpensive method for increasing the usefulness of windows.

Another paper by H. H. Higbie recommends control of light from windows by Venetian blinds rather than by shades. Shades covering the lower sash are better than shades covering the upper sash but the Venetian blinds are the best.

Foundrymen will do well to study the seemingly simple problem of natural light as this problem is one of those so obvious that it has been far too often overlooked.

CORRESPONDENCE and DISCUSSION

Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein

FUNDAMENTALS OF BRASS FOUNDRY PRACTICE

To the Editor of THE METAL INDUSTRY:

In connection with serial publication of Fundamentals of Brass Foundry Practice, it has occurred to me that to invite criticism of the articles as they appear from time to time might be of value.

In submitting this series of articles I am duly conscious that errors in reasoning as well as differences of opinion are always possible and ever to be reckoned with in a work of this nature. I wish, therefore, to invite free and unhampered criticism from the great army of foundry workers. They will constitute a check against error more searching and reliable than any other source could supply. From men such as these, practical men with hard-headed and convincing logic, technical men with their trained powers of mind and thought, supervisory men with their acute capacities for observation, criticism will indeed be a pleasure.

Subject to this kindly criticism as the articles occur from time to time in this magazine, the author can later with confidence compile these articles into book form, secure in the consciousness that they have passed the censorship of the men who have done and are doing—"the men who know."

Erie, Pa., August 16, 1926. R.R.CLARKE.

New Books

Brass Industry. By Wm. G. Lathrop. Published by Wm. G. Lathrop. Size 5½ x 7½, 174 pages. Price payable in advance $2.00. For sale by THE METAL INDUSTRY.

The brass industry in the United States is a study of the origin and development of the brass industry in the Naugatuck Valley, Conn., and its subsequent extension throughout the United States. Mr. Lathrop, the author, is a lifelong resident of the Naugatuck District and has been familiar with the industry from his youth.

Some years ago Mr. Lathrop published a book on the same subject but the editions printed have long since been exhausted. The 1926 edition has been revised, and brought up to date the insistence to the demand for a book of this character.

No one connected with the brass industry can fail to be interested in the simple recital of the beginnings of the manufacture of brass in Connecticut. The articles published in recent years in THE METAL INDUSTRY describing the history and growth of the great brass companies of Connecticut give considerable information on this subject, but naturally enough, this book is more extensive.

As a document of industrial history, the book should find a place in every library. Records like these are difficult to obtain because, for some reason, historians have always paid more attention to wars and dynasties or administrations than to the progress and problems of industry.

Among the subjects covered by this book are the following: early industrial conditions in Connecticut; beginning of the brass industry in Waterbury; growth and development; the market; organization; later deveopments; new methods and machines; competitions and pools; extent of the industry.

Business Correspondence Handbook. By J. H. Picken. Published by A. W. Shaw Company. Size 5½ x 8, 836 pages. Price payable in advance $7.50. For sale by THE METAL INDUSTRY.

Business men are supposed to be either too busy or too "practical" to read very much. The last few years, however, have seen a tremendous rise in the number and circulation of business books. The reason is obviously that business men have learned how to read and find that reading pays.

This handbook by an advertising specialist covers the subject of correspondence in all its phases. It specializes, however, in sales correspondence, without neglecting the other necessary features of a business. Points are illustrated by copies of actual letters which drew a large proportion of inquiries from circularization. The book is bulky and not to be read at one sitting but rather to be considered as a handbook for reference when a particular job comes up.

An idea of the subjects covered can be gained from the following chapter headings: Types of Successful Business Letters; How to Make Letter Openings Effective; Letters That Build Business by Mail; Planning Letter Campaigns to Jobbers and Dealers; Credit and Collection Letters; Letters That Adjust Complaints; Mailing Lists, etc.

Applied Elasticity, by S. Timoshenko and J. M. Lessells. Published by Westinghouse Technical Night School Press. Size 6 x 9, 544 pages. Price payable in advance $6.00. For sale by THE METAL INDUSTRY.

This is a book meant essentially for the designing engineer and student of design, but is of real interest to metallurgists because of the strong bond which exists between the designer of engineering equipment who must specify metals, and the metallurgist or physicist who supplies and tests metals.

The book is not easy or popular in character. It is for the trained technician and is valuable as a reference work in the field of testing of materials. A few of the representative subjects covered are as follows: tension; compression; effective of speed; effect of high temperature; impact tests; hardness; fatigue; working strength.

American Machinists' Handbook. By F. H. Colvin and F. A. Stanley, Published by the McGraw-Hill Book Company. Size 4 x 7—972 pages. Price, payable in advance, $4.00. For sale by THE METAL INDUSTRY.

This is the 4th edition, thoroughly revised and enlarged, of this standard machinists' book. It comprises a general aid and guide for working machinists, foremen, and superintendents of manufacturing plants. It is different from the mechanical engineers' handbooks in that it is intended primarily for the shop man rather than the man in the drafting room or office, but it is nevertheless valuable to everybody engaged in production work, whatever his position.

Many of the old tables have been revised and brought up to date. In a general way the subjects covered by the book are as follows: Screw Threads; Pipe and Pipe Threads; Twist-Drills; Standard Tap Dimensions; Files; Work Benches; Brazing, Soldering and Welding; Gearing; Milling and Milling Cutters; Turning and Boring; Grinding and Lapping; Screw Machine Tools, Speeds and Feeds; Punch Press Tools; Broaches and Broaching; Bolts, Nuts and Screws; Measuring and Fitting; Tapers and Dovetails; Shop and Drawing Room Standards; Wire Gages and Stock Weights; Horse-Power, Belts and Shafting; Steel and Other Metals; Steam Hammer and Drop Forging; Knots and Slings; General Reference Tables; Automotive; Railroad Shop Data; Shop Trigonometry; Dictionary of Shop Terms.

This book should be in the hands of every shop man.

GOVERNMENT PUBLICATIONS

Mineral Resources of the United States in 1925. Preliminary Summary. Introduction by Frank J. Katz. Statistics assembled by Martha B. Clark. Bureau of Mines, Department of Commerce, Washington, D. C. Price 20 cents.

Die Head Chasers. For self-opening and adjustable die heads. Elimination of Waste, Simplified Practice. United States Department of Commerce, Washington, D. C.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ACID SODIUM SULPHATE

Q.—Can you tell us the value of acid sodium sulphate as a pickle? Is there any literature on the subject as to the amount of scale this salt will remove, also provide the concentration of solution necessary to effect the removal of scale?

A.—Acid sodium sulphate, commercial, contains about 24% sulphuric acid. It is used in proportions of one to one and a half pounds of the salts per gallon of water. The pickle so prepared can be used as an electro pickle with direct current, the tank of steel being the anode factor. Good results are reported from such a solution. The maximum concentration should be 2 lbs. per gallon. It is difficult to say how much scale the solution will remove based on pounds per gallon. This will have to be decided upon by yourselves.—C. H. P., Problem 3,557.

CHROMIUM PLATING

Q.—We would like to chromium plate bottle coppers which we manufacture. These coppers are now nickel plated in a satin finish on steel, but due to their severe use, they do not hold up as long as we would like to have them. I have spent considerable time in studying the deposition of chromium plating, but as information on this subject is very limited there remains much for me to learn. Would like you to kindly answer the following questions at your earliest possible convenience.

1. How is the desired acidity tested and controlled in chromium solutions?
2. What is a desirable current density to use for a bright deposit on steel and at what temperature?
3. What is the most desirable anode to use, lead or chromium?
4. Does the bath heat up at high current densities?
5. Is the solution conductive as compared with nickel?
6. What helps the conductivity?
7. Can there be an additional agent added to brighten the deposit?
8. What is a good formula to use for a bright or satin finish deposit on steel that will not infringe on the patent rights of anyone's formula?
9. Should the work have contact before it enters the solution?
10. Are these solutions adaptable to every-day hard working?
11. What time is required for a good deposit?
12. How fast is chromium deposited at a certain current?
13. What are the points in maintaining this type of solution?
14. Can this bath be analyzed by the titration method?

I have before me the letter circular LC 177 from the Bureau of Standards, describing the aplication of chromium on the printing plates they use.

A.—We answer the questions as follows:

1. Write to Dr. Blum, Bureau of Standards, Washington, D. C. He will be able to give you the desired information.

2. A chromium solution that is operated commercially in the Middle West is composed as folows:

Water	1 litre
Chromic acid	200 grams
Chromic sulphate	5 grams
Boric acid	3 grams

Voltage 4 to 6 at the tank terminals. Amperage 125 upwards per sq. ft. of surface area. Temperature 110 deg. F. Either lead or steel anodes may be used and must entirely surround the articles when being plated. The Bureau of Standards' chromium solution is almost identical, except that chromium carbonate is used instead of boric acid. The chromic acid should be increased to 250 grams per litre. It is not advisable to deposit directly upon steel. The surface should be nickel plated first.

3. Covered in number 2.

4. Naturally, the solution when in constant use with high amperages will heat up. A system of coils should be used in the tank so that cold water can continually pass through them. This method would help to maintain a more even temperature.

5. We are unable to say positively whether the solution is more conductive when nickel is added. Experiments are now being carried on with both nickel and cobalt. These salts should be added in the form of hydroxides. If tried out it is possible that relatively high cobalt additions may result in more conductive solutions.

6. Apparently the chromic sulphate.

7. Temperature, current conditions and solution are the factors.

8. Sand blasting is the only effective method.

9. It is absolutely necessary to arrange the articles with a positive contact to assure the best results before the articles enter the chromium solution.

10. From the results of the researches of Sargent in 1907 and later, and Le Blanc published in 1906, Transactions of the American Electrochemical Society, it would seem that the combination of the work done by these two authors, not patented, would insure a commercial practical chromium plating process that cannot be patented.

11. Forty-five to sixty minutes when only as a non-oxidizing protective coating for nickel, etc.; a minimum of 4 minutes.

12, 13 and 14. The Bureau of Standards can possibly answer these points more satisfactorily.—C. H. P., Problem 3,558.

NICKEL ON DIE CASTING

Q.—I am trying to nickel plate die castings and cannot make go of it. I have tried various kinds of cleaners, but have not had any luck, so I copper plate after cleaning. It seems to have a good copper plate, but when they are in the nickel tank they won't nickel all over. They turn black and streak. When they do plate, they burn and the nickel peels off. What causes this? What would you advise for a nickel softener when the nickel gets too hard?

A.—Die castings cannot be nickel plated successfully in an ordinary type of nickel solution. You have found from experience that this is true. Cleaning is a very important factor, but it is no fault of a cleaner when the nickel deposit on the die castings only results in black nickel sulphide streaks. If you add 4 to 6 ozs. sodium citrate per gallon to your present nickel solution per gallon, die castings can be nickel plated without black streaks, etc.

The cleansing should be done with a mild cleaner such as those advertised in THE METAL INDUSTRY (low in caustic soda). The flashing of the die castings in brass or copper solutions is an advantage, although not necessary with a correct nickel solution. Make a test with 10 or more gallons of your present nickel solution with the addition of sodium citrate as outlined and note results. If you want to prepare a nickel solution for die castings exclusively, then the following solution will give you excellent results. It can also be used for brass and steel.

Water	1 gallon
Single nickel salts	12 ozs.
Boracic acid	1 oz.
Sal-ammoniac	2 ozs.
Sodium sulphate (crystals)	12 ozs.
Cadmium chloride	1/50 oz.

The sodium sulphate and cadmium chloride should be added to the solution last. Use a little hydrochloric acid 1/32 oz. per gallon. Voltage 5 to 6. One to two ozs. of nickel chloride added to your present nickel solution per gallon will produce a softer nickel deposit.—C. H. P., Problem 3,559.

NICKEL SILVER STRIP

Q.—Am writing to ask if you can help me out with a good fast strip for nickel silver, hollow and flatware. Have been using an acid silver strip (sulphuric acid and saltpeter), but after the first or second batch it becomes very sluggish. Have a 75-gallon enameled tank that I would like to use with electricity if it is faster. The work to be stripped is plated extremely heavily and is all nickel silver, a few pots having Britannia handles and

hinges. The work is piling up and I cannot keep the polishers going.

A.—One of the best electro strips that has been in commercial every-day use for many years is composed of the following materials:

Water	1 pint
Sulphuric acid 66°	1 gallon
Glycerin	1 oz.

A reverse current is used. The articles to be stripped should be made the anodes and should always be in the center of the solution. The cathode should be sheet copper and should be so arranged that it entirely surrounds the articles to be stripped. This solution will strip almost any deposit from a metal surface. If care is taken not to let the articles remain in the strip after the deposit has been removed, then the surface will be bright and clean. Voltage from 4 to 5. Temperature normal. Try the solution out on a small scale first. If your product is all silver plated that is to be stripped, then use a strong cyanide solution, 1 lb. per gallon; the cathode to be sheet steel and entirely surround the articles. You can use up to 12 volts on this solution.—C. H. P., Problem 3,560.

OLD ENGLISH BURNT BRASS

Q.—We are mailing you under separate cover one small sample fixture piece. We have calls at various occasions for a finish of this kind as per sample, which is called English Old Brass, and we do not seem to come very near the finish in our process, especially to the darkness or stained effect, and there must be some special oxidize with which to produce this special finish.

A.—For the Old English burnt brass finish, which is very popular at present on plain surfaces, the basic metal is brass. The furniture hardware manufacturers use an ammonia sulphuret of antimony solution, prepared as follows.

Aqua ammonia 26°, sufficient to allow the articles to be completely immersed; the ammonia should be placed in a regular acid dip earthenware jar, and arranged to be heated in a hot water tank. When the ammonia becomes hot, then add all the golden sulphuret of antimony the ammonia will take up. The solution should be somewhat plastic. The polished and cleansed brass articles should be immersed in the solution for a few minutes until uniformly coated with an iridescent brown color, then removed. Hang them up to drain for a few minutes; wash in cold and boiling water and finally dry out. A little relieving is advisable. A slow running soft buff should be used to which a little stearic acid is applied. The idea is to drag the finish, not cut clear. When finally lacquered, it will be more antique.

The following solution is also used.

Water	1 gallon
Caustic potash	8 ozs. Temp. 180° F.
Crimson or golden sulphuret of antimony	½ to 1 oz.

Methods as outlined.

The lead acetate solution is also used.

Water	1 gallon Temp. 180° F.
Hyposulphite of soda	8 ozs.
Lead acetate	2 to 4 ozs.
Acetic acid	⅛ oz.

A little experimenting will be required to produce satisfactory results. This finish can only be produced upon brass, so copper must be brass plated to match up with articles made of solid brass, and produce a uniform finish.—C. H. P., Problem 3,561.

OXIDIZED GILDINE

Q.—We are pleased to enclose herewith half of a sample dial. We have been experimenting with material along these lines and should be pleased to have your opinion as to just what kind of metal the enclosed sample is, and what method of black (whether it would be oxidized or plated) has been applied.

A.—The composition of metal as per sample is about 90% copper and 10% zinc. The alloy is known in the trade as Gildine or Platers' metal. Another alloy of nearly the same color consists of 85% copper, 15% zinc. You can obtain these metals from a number of the brass manufacturers in Connecticut. We are of the opinion that the finish on the sample is produced as follows:

1. The articles after fabricating, are cleansed, acid bright dipped, recleansed, washed and black nickel plated although a solution consisting of 4 ozs. hyposulphite of soda and 4 ozs. lead acetate per gallon of water heated to 180 to 200 deg. F.
2. After oxidizing, the black surface should be removed as desired with pumice stone powder or silex powder and water. After relieving then dry out as usual.
3. The surface should be very lightly sand blasted with finely ground glass to produce the matte finish and finally lacquered to protect the finish.—C. H. P., Problem 3,562.

PEWTER FINISH

Q.—Kindly inform me as to whether there is a formula for plating pewter on brass chandeliers. I am now using a dull nickel solution. Is this the proper method?

A.—You cannot deposit a pewter alloy which approaches lead in color without much trouble. The best you can do is to finish your articles in a dull nickel as you are doing at present or try the following lead plating solutions. You do not require a heavy deposit; just sufficient to brush down and lacquer for fixture work.

Solution 1:

Caustic soda	27 ozs.
Lead acetate	9½ ozs.
Powdered rosin	½ oz.
Water	1 gallon

Temperature 180 deg. F. at 2 to 3 volts. Use lead or steel anodes.

Solution 2:

Rochelle salts	6 ozs.
Lead cyanide	2 ozs.
Caustic potash	1 oz.

Temperature 160-180 deg. F., at 2 volts. Anodes, lead or steel. We believe these solutions will give you the most ideal pewter finishes.—C. H. P., Problem 3,563.

PICKLING WHITE GOLD

Q.—We would appreciate it very much if you could inform us how we could avoid a white gold mounting turning to a dark brown color. We tried several ways of pickling them. We sincerely believe that you can tell us some way how this could be avoided. Kindly advise us what solution would be proper to use to avoid this difficulty. I will deem it a great favor if you will write me personally regarding the above request.

A.—We suggest the following procedure to produce a clear uniform color on white gold mountings.

1. Removal of fire scale. Immerse in the following solution until the fire scale is dissolved:

Water	1 gallon
Sulphuric acid 66°	16 to 24 ozs.
Bichromate of soda	2 to 4 ozs.

Temperature 120 to 160 deg. F.

2. After pickling, wash thoroughly in water, then strip in a cyanide solution with a reversed current or just the opposite to plating.

Water	1 gallon
Sodium cyanide	16 ozs. Temp. 140° F.
Caustic potash	1 oz.

Use steel as the cathode; the articles become the anodes. Keep the articles moving while stripping; the mountings should then be white and clean.

If the cyanide electro-strip does not give satisfactory results, then try the following solution operated exactly the same except the cathode should be sheet lead. Voltage should be from 6 to 8 with both solutions.

Water	1 gallon
Sodium cyanide	8 ozs.
Rochelle salts	2 ozs.
Phosphate of ammonia	1 oz.

The methods as outlined should give you the desired results.—C. H. P., Problem 3,564.

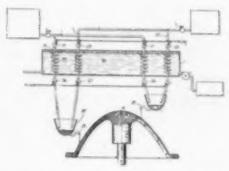
PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,593,397. July 20, 1926. **Process and Apparatus for Electrodeposition.** Thomas Robinson, New York, N. Y., assignor to Anaconda Sales Company, New York, N. Y.

A process of electrodeposition which comprises moving an anode and a cathode simultaneously through a cell containing an electrolyte, and during such movement maintaining a connection between the anode and the positive side of a source of electrical energy and a connection between the cathode and the negative side of the source of electrical energy.

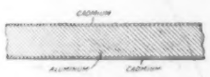
1,593,998. July 27, 1926. **Method of Depositing Silver.** Blasius Bart, East Orange, N. J.



In the art of coating with silver an object having an inclined side, the method which consists in directing a plurality of streams of a mixture of silver solution and a reducing reagent therefore on to said inclined side at vertically spaced points, regulating the streams so that a continuous film will be formed on the side and each stream will flow down the side and cover its apportioned area by the time the mixture has completed its reducing reaction and lost its fluidity.

In the art of coating objects with silver, the process which includes the step of causing drops of a mixture of a silver solution and a reducing reagent therefore to fall through air onto the object being coated while completing the reducing reaction.

1,594,061. July 27, 1926. **Corrosion-Resisting Metal.** Charles E. Jones, Schenectady, N. Y., assignor to General Electric Company, a corporation of New York.



An article of manufacture consisting largely of aluminum and an electrodeposited coating of cadmium thereon whereby said article is rendered resistant to the corrosive influence of a salt atmosphere.

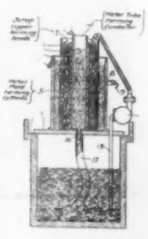
1,594,201. July 27, 1926. **Composition of Matter.** Charles Horan, New York, N. Y.

A new composition of matter, comprising a non-inflammable composition of high electrical resistance consisting of pyroxylin dissolved in ether-alcohol, an amount of ammonium phosphate materially greater than that of the pyroxylin and gum-camphor.

1,594,424. August 3, 1926. **Method of Refining Metals.** John J. Mulligan, East Chicago, Ind., assignor to United States Smelting, Refining & Mining Company, Portland, Me.

In a method of refining metals which consists in subjecting molten metal to treatment with a caustic alkali reagent to dross the impurities therein, the addition to the floating dross preparatory to its removal of a material which thickens the fluid caustic therein.

1,594,509. August 3, 1926. **Apparatus for Producing Articles by Electrolytic Deposition.** Gunnar Rosenqvist, New York, N. Y.



An apparatus of the character described, comprising, in combination, a tub adapted to contain an electrolytic solution, a metal mold disposed outside of said tub, a basket disposed within said metal mold and adapted to contain scrap copper, means for causing a circulation of the solution from said tub through said basket, and means for electrically connecting said scrap copper and mold with a source of current.

1,594,521. August 3, 1926. **Filler Composition for Wood and Metal.** Albert Hinze, Parlin, N. J., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del.

A filler composition for wood and metal comprising silex, a soft odeo-resin, nitrocellulose and a volatile solvent of the resin and nitrocellulose.

A filler composition for a surface to be coated comprising between about 45 and 65 parts of a filler base and between about 8 and 15 parts of a resinous binder therefor that is at least partly soluble in the solvent used for the finish coat with which said surface is to be covered.

1,594,589. August 3, 1926. **Continuous Furnace.** Thaddeus F. Baily, Alliance, Ohio.

An annealing furnace comprising an elongated chamber, means for passing material continuously through the chamber, means for subjecting the material to a maximum temperature at an intermediate point in the chamber, means for passing a nonoxidizing or reducing gas through the chamber in the opposite direction to the travel of the material and means for returning the gas in a closed circuit to the opposite end of the chamber.

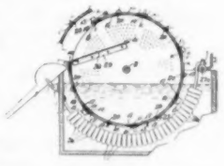
1,595,058. August 3, 1926. **Alloy.** Aladar Pacz, Cleveland, Ohio, assignor to Aluminum Company of America, Pittsburgh, Pa.

An aluminum base alloy containing 3 per cent to 15 per cent of silicon, 1.0 per cent to 1.5 per cent of copper and 0.5 per cent of manganese.

1,595,089. August 10, 1926. **Buff Wheel.** Wesley F. Hall, Matawan, N. J., assignor to A. P. Munning & Company, of New York, New York, N. Y.

A buff wheel comprising two separate series of fabric pieces angularly stepped and lapped to make up complete circles, the working edges of the pieces in the said series being oppositely inclined to the plane of the wheel.

1,595,108. August 10, 1926. **Electroplating Apparatus.** Fred W. McCormick, Grand Rapids, Mich.



A plating barrel comprising a horizontally mounted shaft, metal end members secured to said shaft in spaced apart relation, metal contact members connecting the ends and disposed in spaced apart relation to each other around said ends, and a plurality of segments detachably connected to and disposed between adjacent contact members, each of said segments comprising an open metal frame and a lining of non-conducting material at the inner side of the frame, means for detachably connecting said segments in place, and electric insulating means covering the surfaces of said ends, metal frames of the segments and the outer surfaces of the means used to detachably connect the segments in place, substantially as described.

1,595,218. August 10, 1926. **Aluminum-Silicon Alloy.** Aladar Pacz, Cleveland, Ohio, assignor to Aluminum Company of America, Pittsburgh, Pa.

An alloy consisting predominantly of aluminum and containing a small percentage of manganese and between about 2½ per cent and about 15 per cent of silicon.

1,595,219. August 10, 1926. **Alloy.** Aladar Pacz, East Cleveland, Ohio, assignor to Aluminum Company of America, Pittsburgh, Pa.

An alloy consisting predominantly of aluminum, containing between about 2½ per cent and about 15 per cent of silicon and containing cobalt in an amount less than the silicon.

1,595,675. August 10, 1926. **Method of Applying Protective Layers on Metals or Other Electric Conductors.** Jonas Hjalmar Mellquist, Stockholm, Sweden.

Electrogalvanic method of applying a protective layer of high oxidation potential on electric conductors, especially metals, consisting in using said conductors as an anode in an alkaline solution of an oxi carbonic acid salt of a metal adapted to form peroxides.

1,595,967-1,595,971. August 10, 1926. **Electric Furnaces and Furnace Crucible.** John A. Seede, Schenectady, N. Y.; Magnus Unger, Pittsfield, Mass.; James M. Weed, Schenectady, N. Y., and Giuseppe Faccioli, Pittsfield, Mass., assignors to General Electric Company, Schenectady, N. Y.

Patents relating to furnace crucible and induction furnaces for melting metals.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

CORE OVENS

The Millett Core Ovens, made by the Lamb Knitting Machine Company, Chicopee Falls, Mass.

The feature of this oven is its set of hinged swinging shelves with self-closing back door. The cores are placed on the swinging shelves which operate independently. In swinging a shelf outward the rear door closes the opening, thereby keeping the heat in the oven and saving fuel. Cores can thus be removed from any shelf without lowering the temperature of the oven or delaying the baking process of other cores.

MILLETT CORE OVEN

PORTABLE CORE OVENS

Portable ovens are designed for use with coal, coke or gas. They are made with a double casing and are insulated with asbestos filler to prevent the escape of heat, thereby reducing fuel costs and undue heating of the core room.

SPECIFICATIONS

Height over all	57 in.
Width	36 in.
Depth	36 in.
Height of legs	6 in.
Fire box area	114 sq. in.
Smoke pipe	6 in. diam.
4 upper doors	5 in. x 30 in.
Lower door	10 in x 30 in.
Approximate weight	800 lb.

STATIONARY CORE OVENS

Stationary ovens are built ready to be set into brick work or concrete. They have the hinged swinging shelves and can be furnished with doors opening toward the right or left. These ovens can be installed in batteries of any desired number.

SPECIFICATIONS

Width of front	45 in.
Height of front	65 in.
6 upper doors each	5 in. high x 32 in. wide
Lower door	10 in. high x 32 in. wide
Approximate weight	1,000 lb.

METALLIC POLISHING MATERIAL

"Beaver Pebs" is the trade name of a metallic polishing material comprising unsymmetrical polished units, each of which is substantially pebble shaped, a portion of which have projections adapted to make polishing contact with the angular surfaces of the metal part to be polished. These "Pebs" are for use in barrel furnishing or tubbing of metal parts.

It is stated that they will reach all the small corners, sharp angles and crevices of the work to be burnished without the addition of costly auxiliaries such as pins, cones, oats or spickets. They are used in exactly the same manner as the ordinary burnishing balls. Greater output at reduced cost is claimed.

Beaver Pebs are manufactured solely by H. Leroy Beaver, Philadelphia, Pa.

REFRACTORY CEMENT

The Carborundum Company, Perth Amboy, N. J., is marketing a cement called Carbofrax No. 3, for use in hammed-up monolithic linings. It is suitable and widely used for metal melting furnaces, both crucible and non-crucible type. Directions for use are as follows.

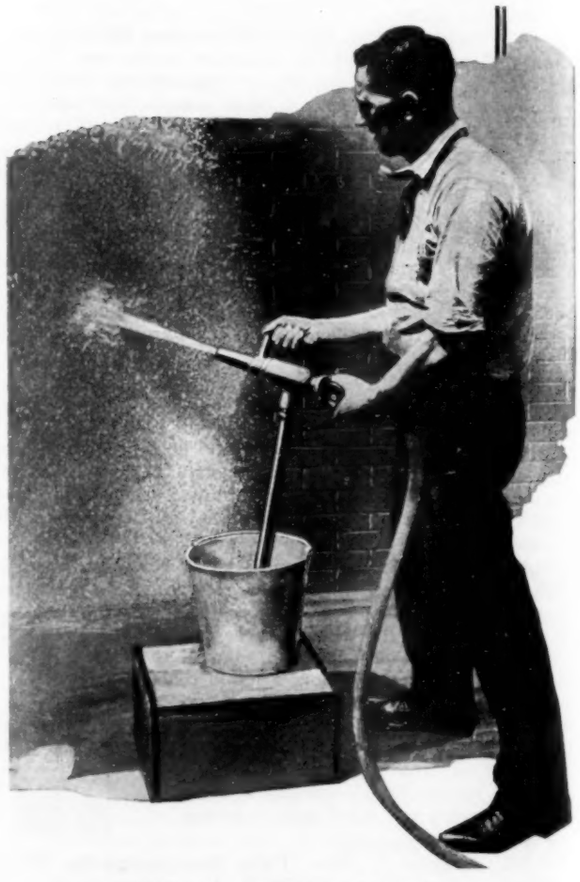
Figure 135 lbs. of cement per cubic foot of lining. Place cement in mortar box, then slowly stir in water until the cement has the same consistency as molding sand, so that when squeezed in palm of hand it will retain sharp impression of fingers.

With ramming tool pound cement compactly into place between shell of furnace and removable core or temporary form. Work the cement in place in small quantities to get uniform density and to prevent laminations. Remember that the greater the density, the better will be the lining.

When ramming is completed, remove core and drive off the moisture in the lining with a slow fire. Before placing furnace into service subject lining to a heat slightly in excess of operating temperature.

CARBOPLASTIC GUN

This company also manufactures a "gun" as an accessory for use in patching fire brick work. It has a low cost, is simple and



USING THE CARBOPLASTIC GUN

controlled by a single valve located on the instrument. It works with either saturated or superheated steam or air pressure at 100 pounds or more. It is designed for use with Carboplastic Cement.

REFRACTORY CEMENTS

The control and use of heat in many industrial processes depends upon refractory materials that may be sprayed, painted, poured, trowelled, or rammed into position.

Norton refractory cements (made by the Norton Company, Worcester, Mass.) have been developed to meet these requirements. Three different heat-resisting chemically inactive materials form the body of the mixtures. These materials are electrically fused alumina, silicon carbide, and electrically fused magnesia. All three stable, highly refractory substances of high heat conductivity, when mixed with carefully chosen bonds also having refractory properties, provide a complete range and variety of cements which are used by mixing to a working consistency with water. Heat is required to mature the bond and develop full body strength.

CRYSTOLON CEMENT IN PIT FURNACES

ALUNDUM CEMENTS

Alundum cement consists essentially of electrically fused alumina mixed with a suitable ceramic bond.

On account of the following properties these mixtures are valuable for imbedding the resistor wires in flatirons, hot plates, etc.

1. High Thermal Conductivity 4 times that of fire clay.
2. Electrical insulator.
3. Chemical inactivity toward different metals used as resistors throughout a wide range of temperature.

CRYSTOLON CEMENTS

Crystolon cement is composed of silicon carbide with a suitable proportion of ceramic bond.

These mixtures provide an "acid" lining. They are not recommended for use in contact with wire resistors but are used successfully in furnaces heated by an electric arc or a carbonaceous fuel.

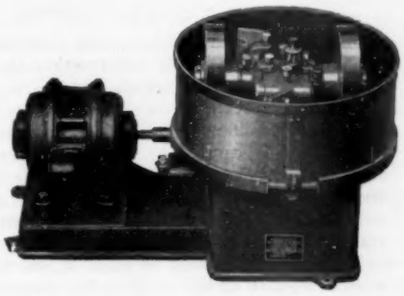
NORTON MAGNESIA CEMENTS

The essential elements of Norton magnesia cements are electrically fused magnesia and the bonding material. Norton magnesia cements provide basic linings for ovens, cupels and furnaces.

The use of sodium silicate (water glass) with cements is not recommended when they are to come in contact with resistor units in electrically heated appliances. As a surface wash it is sometimes used to toughen against rough handling. Damage to resistor elements has been traced to this practice.

LABORATORY SAND MIXER

A Simpson Laboratory Mixer is now being marketed by the National Engineering Company, Chicago, Ill. This laboratory mixer is built along the same lines as the larger, well known Simpson Intensive Sand Mixer, used for the preparation of core, facing and backing sand in foundries.



SIMPSON LABORATORY MIXER

This mixer, it is claimed, will be a great help to those interested in sand preparation, reclamation and control, as the results obtained in the laboratory with the small mixer can be put into practice by the use of the larger size mixers in the foundry. This machine is sold complete with motor, weighs approximately 400 pounds, will mix a batch of from 8 to 15 pounds of sand, and is so designed that it can be taken apart and cleaned thoroughly in a very few minutes. Every foundry laboratory could use such a mixer as the subject of sand preparation and reclamation is a very important one and has a very marked effect on costs.

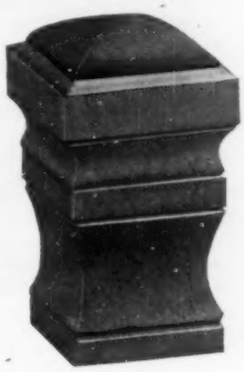
SLUSH CASTING

Below is an illustration of a casket handle tip slush cast by the Byrd machine. The tip is turned out ready to be sent directly to the polisher from the casting machine. There is no trimming to be done. It is stated also that the casting is lighter than could be made by hand.

The metal is antimonial lead; antimony 13, lead 87.

The dies are never touched by the operator as they are mounted in a die bolster, thus, it is claimed, eliminating a considerable amount of tool-maker's work in refitting the molds. The cores are moved in and out on a plate with parallel guide pins. One, two or three tips as shown can be cast at each operation.

Old molds can be fitted to the bolster mentioned above, thus making it unnecessary to make new molds for use with this equipment.



SLUSH CASTING

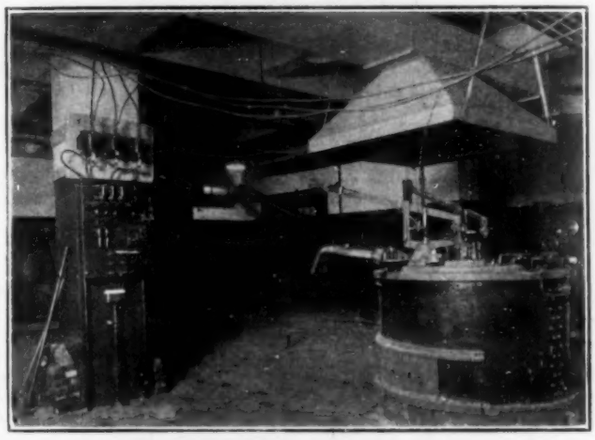
The machine is made by R. E. Byrd, 318 Reed Street, Erie, Pa.

ELECTRIC STEREOTYPE POT

Substantial economies and simplification of melting and casting are said to have followed the adoption of an electrically heated pot for melting stereotype metal in the new plant of the Waterbury Republican American, Waterbury, Conn.

The electric pot has a capacity of five tons and heat is furnished by nine General Electric cast-in heating elements of the sheath wire type, each rated 5 kilowatts at 220 volts. Accurate temperature is maintained at all times, it is stated, by means of an automatic control panel and a thermostat with a sensitive bulb in a well in the pot. Fuel cost figures are given as follows:

A gas-heated pot, superseded by the electric melting pot, consumed approximately 131,000 cubic feet of gas per month at a cost of $1 per thousand cubic feet, making a total of $131 per month for fuel. Against this, the electric pot uses an average of 8,000 kilowatt-hours per month costing at the rate of 1.25c per kilowatt-hour,



FIVE TON STEREOTYPE ELECTRIC MELTING POT

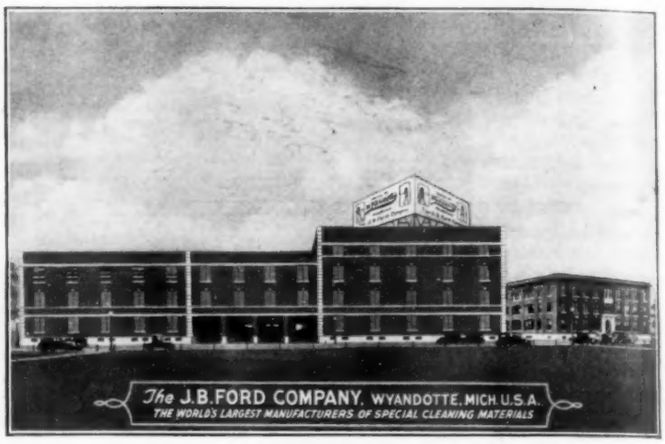
or a total of $100 per month for operating electric current.

One of the most important advantages found with the electric pot was the ease and simplicity of operation. Little more than a half hour is needed to bring the metal from the stand-by temperature of 450° F. to the operating temperature of 620° F. when charging is begun. After the pot is charged it is brought back up to operating temperature again in from 30 to 45 minutes. Plant operators find the necessity for a close watch on the temperature of the metal is no longer necessary, as this temperature is automatically held constant.

NEW PLANT FOR J. B. FORD COMPANY

Nearly thirty years ago The J. B. Ford Company of Wyandotte, Michigan, was organized for the manufacture of commercial cleaning materials. That this company has been successful is evidenced by the new factory and office buildings of The J. B. Ford Company shown here. This building is 285 feet wide, 370 feet on its longest side, 73 feet high in front, and 84 feet high at the rear. Some idea of the output of this factory may be gained by knowing that the total capacity of the storage tanks for the raw materials from which Wyandotte Products are made is over 154 tons.

The illustration alongside pictures only the finishing departments of The J. B. Ford Company, the raw materials being produced in a plant that is not shown. Should these figures seem unreasonable, it must be remembered that practically one-third of the total working time of the world is spent in performing cleaning operations of one kind or another. As invention and civilization progresses, the number and type of cleaning operations increases instead of decreases. With this increase in cleaning operations it naturally follows that more efficiency and more economy must be secured from the cleaning materials used.



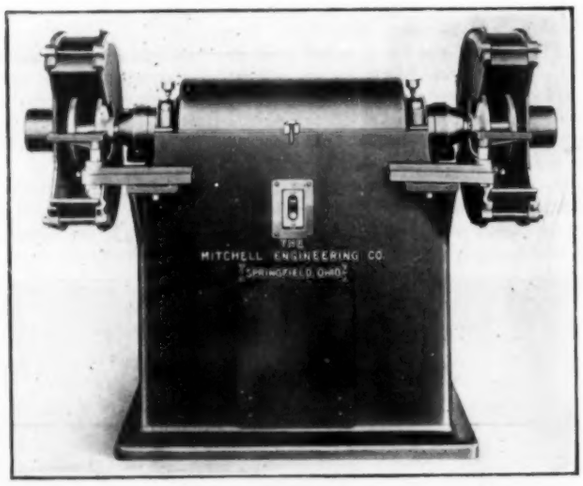
NEW J. B. FORD PLANT

MOTOR-DRIVEN TWO-SPEED GRINDER

A new motor-driven grinder has just been brought out by The Mitchell Engineering Company, Springfield, Ohio, that has several new and unique features.

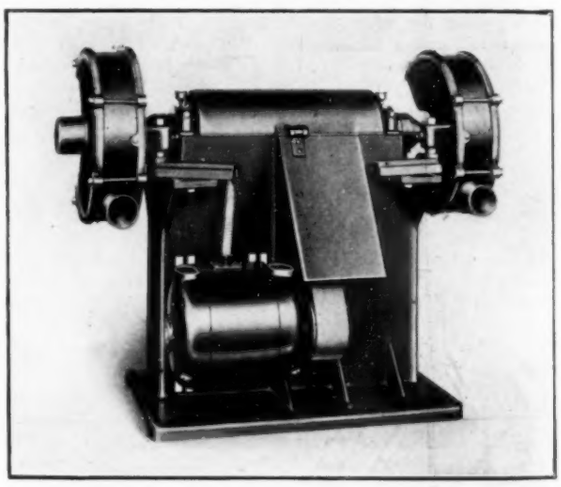
Chief among these is the fact that two spindle or wheel speeds may be obtained, the spindle being provided with a two-step cone pulley slidably mounted. Thus, after wheels wear down, say, from 20 inches to 18 inches diameter, the belt may be applied to the other step of cone and the proper peripheral speed of wheel obtained after this has been reduced in diameter.

Further, it will be noted from illustrations, a ball bearing fully enclosed ventilated motor is employed, this being slidably mounted for vertical adjustment to keep the belt taut. This type of motor not only excludes all dust and dirt prevalent in the grinding room, but also insures a cool running motor. A powerful fan is mounted on one side of the rotor for drawing clean fresh air from the most convenient source into one of the oval openings shown, forcing the air through the windings and discharging from the other opening. The machine is further provided with magnetic switch and "start" and "stop" push button control.



MOTOR DRIVEN GRINDER, FRONT VIEW

The wheel load is carried by four heavy duty ball bearings mounted in heavy cast iron bearing housings with a spherical center. These bearing housings with bearings are mounted on spindle, making a complete assembly, which is carried in concave seats in the base or pedestal, the ball and socket mounting of bearing housings, base and cap, insuring absolute alignment of the spindle and bearings, and distributing the load equally on all four bearings. This construction also facilitates dismounting and re-assembling the spindle and bearing unit in a few moments' time and by anyone.



MOTOR DRIVEN GRINDER, BACK VIEW

Another advantage claimed for this machine is the fact that no wheel load is carried by the motor bearings, the wheel spindle being carried in separate bearings, the motor bearings are free from any vibration caused by unbalanced grinding wheels.

The general construction also facilitates the application of any standard motor where preferred.

These machines will be built in several sizes to accommodate wheels from 10 inches to 24 inches diameter. They are distributed by Frederic B. Stevens, Detroit, Michigan.

POLISHING AND BURNISHING BARREL

For removing cutting compound, dirt, dull or unfinished appearance or preparatory to plating metal articles, together with a quantity of small hardened polished balls and cleaning solution, are charged in a Patterson barrel and rotated until the desired degree of bright finish or cleanliness is obtained.

Articles intricate in shape or small in size, are easily handled. The finished goods are said to present an appearance superior to hand operation and are ready for the market or further treatment such as plating.

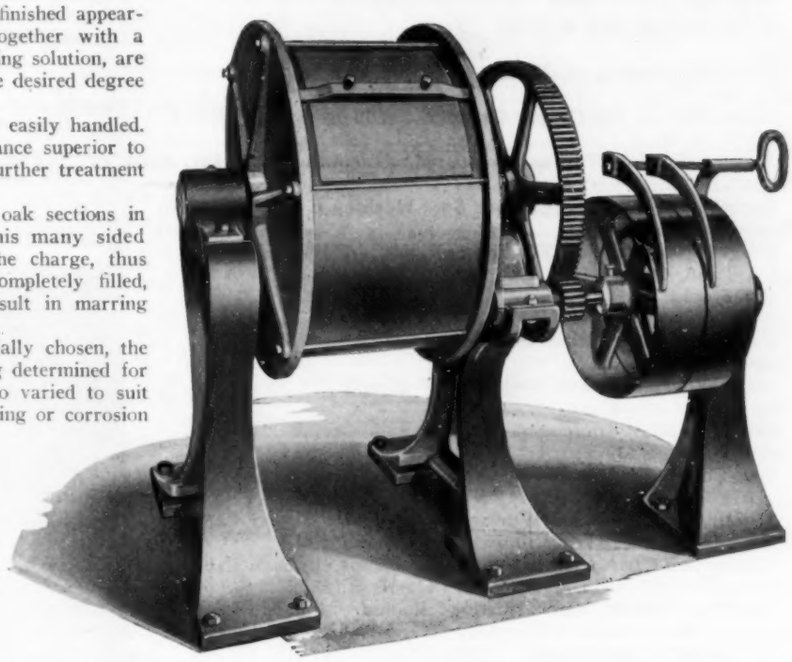
All Patterson barrels are lined with seasoned oak sections in such a way that the interior is octagonal. This many sided interior assists in the pushing and rolling of the charge, thus effecting a quick result. Barrels are almost completely filled, otherwise a falling or grinding action would result in marring light or thin parts.

Balls having a hard glass-like finish are especially chosen, the assortment of sizes and ratio to metal parts being determined for each installation. Speed of barrel rotation is also varied to suit conditions. There is said to be no danger of rusting or corrosion of steel parts if full directions are followed.

Patterson barrels are built single, duplex, triplex. The barrel consists of two cast iron heads into which a steel shell is fitted and held together by means of tie rods.

Fully enclosed roller bearing mounting is provided. Metal gear guards afford complete protection from the driving gear. All barrels are supplied with quick-opening charging doors.

These barrels are made by the Patterson Foundry & Machine Company, East Liverpool, Ohio.



PATTERSON POLISHING AND BURNISHING BARREL

PORTABLE FILTER AND SELF-PRIMING PUMP

William E. Belke announces a successor for his new slusher. The slusher was announced last month as a device for the cleaning tank. He now introduces a new portable filter and self-priming pump.

Mr. Belke is president of the Belke Manufacturing Company, 2952 West Van Buren Street and is inventor of all products manufactured by his company, including rubber-clad plating racks, and buckets, and several filtering and agitation systems.

In the electroplating industry he states that it is essential that any pumps used must be of the centrifugal type, and enclosed with acid-resisting material. This is necessary because there can be no oiled parts where the acid enters and rushes through the pump, as this would react in the acid. Only the centrifugal type pump has this feature, but the difficulty has been to make that type of pump which would be self-priming.

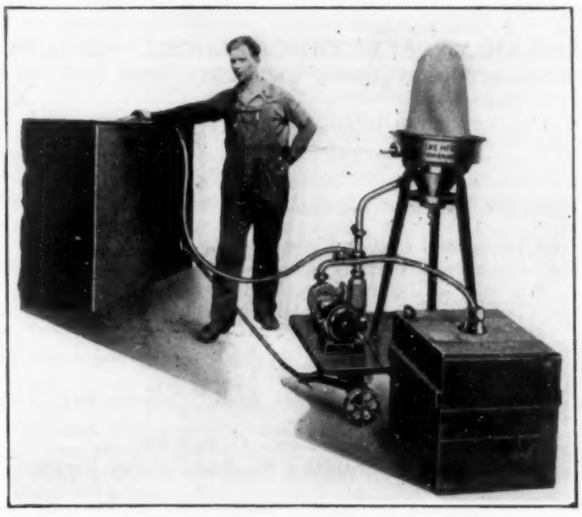
Priming of a pump, when working with acids is a dangerous procedure. In the plating shop, where acids must be taken from carboys and pumped to tanks, and where acid solutions must be pumped out of tanks for filtration, priming with water is dangerous.

In a non-self-priming pump, it will be found that sufficient suction cannot be brought into the intake hose unless the hose is first filled with water. This is because the empty hose, pumping water through the air channel, cannot create a sufficiently strong vacuum. It is necessary, therefore, to first fill the hose with water, and then place it in the solution, where it will syphon the water out. When pumping water the priming medium may also be water, but it is evident that were water used when pumping acid, the results would be disastrous. Many acids, when in contact with water, cause explosions, and in other cases, the water weakens the acid.

So, when pumping acid, it was necessary to prime the hose with acid, and to do it by hand. This has caused accidents where employee's hands were burned.

Realizing this, Mr. Belke produced a pump which it is claimed, will commence to suck acid, water, or any solution immediately when the intake hose is placed in the liquid. This was made possible by placing a specially arranged lead bottle in the pump at a place where the small drops of liquid brought through the hose by the incomplete suction would gather. These drops gather and form the body for the hose to develop its full suction power. Thus, when placing the intake hose of a Belke self-priming pump into a liquid, the suction starts incompletely, but works to full power in a few seconds. The pump can transfer liquid at the rate of 600 gallons per hour.

It is this type of pump which is part of the equipment of the new portable filter. The filter, itself, however, has many unique



BELKE FILTER AND PUMP

and improved features. It rests on a tripod on a movable platform, the filtering reservoir and felt hat being on top. The filter works by pressure. The pump forces liquids up through the hollow of the reservoir, and into the felt hat, which is $\frac{3}{8}$ inch thick and 24 inches by 26 inches in dimensions. The impure liquid fills up this hat, and forces through the pores of the hat, falling down into the reservoir, where it flows by gravity into a tank. It will filter 600 gallons per hour.

EQUIPMENT AND SUPPLY CATALOGS

Hardinge Conical Mill. Hardinge Company, New York.

Universal Grinding Machine. Norton Company, Worcester, Mass.

Hardness Testing of Metals. Wilson-Maeulen Company, Inc., New York.

Brass, Bronze and Copper Castings. William H. Barr, Inc., Buffalo, N. Y.

Venturi Suction Torch. Hauck Manufacturing Company, Brooklyn, N. Y.

Nickel Itch Salve and Cyanide Sore Healer. E. Wambaugh Company, Goshen, Ind.

Progress in Machine Forging. National Machinery Company, Tiffin, Ohio.

Die Stocks. No. 70 Series Beaver Adjustable. The Borden Company, Warren, Ohio.

Coxe Traveling Grate Stoker. Combustion Engineering Corporation, New York.

Flexible Grinding and Polishing of Metals. Norton Company, Worcester, Mass.

Better Pickling Equipment—Duriron and Alcumite. Duriron Company, Inc., Dayton, Ohio.

Red Crown Electric Hot Water Heaters. Hynes and Cox Electric Corporation, Albany, N. Y.

Lighting of the Metal Working Industries. Edison Lamp Works, General Electric Company, Harrison, N. J.

Theory and Characteristics of Mazda Lamps. Edison Lamp Works, General Electric Company, Harrison, N. J.

Lighting Offices and Drafting Rooms. Edison Lamp Works, General Electric Company, Harrison, N. J.

Co-operative Advertising. Policyholders' Service Bureau, Metropolitan Life Insurance Company, New York.

Calculation of the Lighting Installation. Edison Lamp Works, General Electric Company, Harrison, N. J.

Power Transmission Machinery. Catalog No. 26. Hill Clutch Machine and Foundry Company, Cleveland, Ohio.

Motor Car, Garage, and Display Room Lighting. Edison Lamp Works, General Electric Company, Harrison, N. J.

Physical Examinations in Industry. Policyholders' Service Bureau, Metropolitan Life Insurance Company, New York.

Cleaning, Rinsing and Drying Machines. No-Dust Drying Machine Company, Division of the Blake and Johnson Company, Waterbury, Conn.

Testing and Approval of Automobile Headlamps and Tail-lamps, With Rules and Specifications. Electrical Testing Laboratories, New York.

Sal-Hyde Electro-Plating Outfits for gold, silver, platinum, nickel, bronze and copper plating, stripping, etc. W. Green Electric Company, New York.

Cylindrical Grinding Machines. Power traverse; hand traverse; special purpose; autopart regrinding machine; Norton Company, Worcester, Mass.

General Electric Publication. Wound Rotor Induction Motors; Direct-Current Crane and Hoist Hotors; Constant-Speed, Direct-Current Vertical Motors; Semi-Automatic Welder; Induction Motor-Generator Sets; Welding Head and Accessories.

BRASS GOODS CATALOG

The New Official Catalog of the National Association of Brass Manufacturers, Chicago, Ill., will be issued on January 1, 1927.

This catalog is departing from the old time-honored custom of "the dozen" list and all goods will be listed by the "piece." But what will be of more interest is the fact that the lists are going to be materially reduced so as to take a discount of say about 50 and 25 instead of the old run of high and fictitious discounts of 75 to 80 and 10, which only tended to deceive the public, bring the goods entirely too high and the lists into disuse. In addition, a complete line of shower, bath, lavatory, kitchen and hospital fixtures will be shown.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN ELECTROCHEMICAL SOCIETY

HEADQUARTERS, COLUMBIA UNIVERSITY, NEW YORK CITY

HOTEL WASHINGTON, HEADQUARTERS FOR WASHINGTON, D. C. MEETING

The Fall Meeting is scheduled for October 7, 8 and 9. To date the following papers have been received and accepted for publication:

Refractories for Induction Furnaces.—M. Unger.

The Common Properties of Addition Agents in Electrodeposition.—Giichiro Fuseya and Kwanji Murata.

The Electrical Resistivity of Aluminum-Calcium Alloys.—J. D. Edwards and C. S. Taylor.

Metals to Resist Corrosion or High Temperatures.—H. J. French.

Relatively Fine-Grained Deposits from "Unsatisfactory" Electrolytes.—E. A. Vuilleumier.

Experiments on Throwing Power.—O. P. Watts.

Cadmium: Its Electrodeposition for Rust-Proofing Purposes.—Clayton M. Hoff.

Thermal Insulation of Electric Furnaces.—M. L. Hartman and O. B. Westmont.

Refractories for Melting Pure Metals: Iron; Nickel; Platinum.—Louis Jordan, A. A. Peterson and L. H. Phelps.

The Welding of High-Chromium Alloys Intended to Meet Extreme Conditions.—Stanley M. Norwood.

According to the report of the Chairman of the Publication Committee, about a dozen more papers are under consideration.

Dr. H. W. Gillett of the Bureau of Standards, is responsible for the symposium on "Materials for Extreme Conditions in the Electrochemical Industries." The symposium is scheduled for Thursday morning at Hotel Washington, Dr. Gillett presiding. Thursday afternoon will be devoted to a trip to Mt. Vernon, and on Thursday evening there will be a dinner followed by a dance at Hotel Washington. The dinner will be joint with the local members of the A. C. S.

Friday morning will be devoted to papers on Electrodeposition and on Friday noon a Round Table Discussion will be held under the chairmanship of Prof. E. M. Baker. The subject of the Round Table will be "Preparation for Electrodeposition." The afternoon will be devoted to trips to laboratories and industrial plants.

BRIDGEPORT BRANCH, A. E. S.

HEADQUARTERS, CARE OF R. J. O'CONNOR, 1228 NOBLE AVENUE

The Bridgeport Branch will hold its Annual Outing at the Interdale, Milford, Conn., on September 18, 1920.

The Committee has provided for a full course dinner and other refreshments. Games of all kinds, including baseball, can be enjoyed as there are about six acres of picnic ground at their disposal. The Outing will be held, in case of rain, in a spacious pavilion, where there will be dancing.

Tickets, including all refreshments, are $3.50 each.

NEW YORK BRANCH, A. E. S.

The August meetings of the New York Branch, A. E. S. were well attended. The members decided to hold their shore dinner

at Tappen's Hotel, Sheepshead Bay, on Saturday, September 11 at 6:30 P. M. The members will bring their wives and friends along. They are all welcome.

At the last meeting held the members decided to adopt the old schedule which was once in force, to have the first meeting of the month for business and the second meeting to reading of papers, and discussion. It is believed that it will awaken the debates among members which once were famous among platers.

Discussion on black on zinc solution was taken up at the last meeting and the discussions were lengthy and instructive.

Personals

W. J. REARDON FORTY YEARS IN THE BRASS FOUNDRY

William J. Reardon was born in 1870 in Paterson, New Jersey. After attending the parochial and the public schools of that city, he began work in 1885 in the brass foundry of the McNab and Harlin Company, where he served an apprenticeship of three years as a coremaker and molder. In 1888 he entered the employment of the Kelly and Jones Company of Jersey City and went with that company from Jersey City to Greensburg, Pennsylvania. Having remained there a short time, he returned east to a position with the Yale and Towne Manufacturing Company. Shortly afterwards he was employed by the Riverside Smelting and Refining Company, for whom he installed smelting and refining furnaces for the recovery of lead, tin and babbit drosses.

WILLIAM J. REARDON

In 1893 he returned to Greensburg, Pennsylvania, to take charge of the brass foundry of the Kelly and Jones Company. While in charge of this foundry he took an important part in the installation of one of the first power ram molding machines for brass foundry work in the United States. In 1899 he accepted a position as superintendent in the Kennedy Valve Company, then at Coxsackie, New York, now at Elmira, New York. Here too he introduced the power ram molding machine and other modern equipment. In 1902 he became foundry superintendent of the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania. There he equipped the Westinghouse foundries with the first power ram molding machines to be used by that company. In 1903 he was sent to assist in the introduction of modern methods into the Westinghouse foundries in England and in France and to standardize the alloying processes in those works.

Returning to East Pittsburgh in 1904, he very successfully put into operation the open flame furnace for melting brass and aluminum. He also did considerable work with Mr. Wile—of Pittsburgh in connection with the electric furnace. At that time Mr. Reardon was interested in making alloys of 5 percent nickel and 95 percent iron for resistence grids. He next installed for the Westinghouse Electric and Manufacturing Company a smelting and refining plant for the recovery of waste metal, which was considered one of the most modern and efficient recovery plants in the country. It consisted of a copper refining furnace, a brass refining furnace, and a tin and lead refining furnace. This plant was responsible for the elimination of an enormous waste of metal, and was extremely profitable.

He left the Westinghouse Electric and Manufacturing Company in 1916 to engage in making copper driving bands for schrapnel shells for the Rome Manufacturing Company, Rome, New York. After the war, in 1919, he accepted a position as foundry superintendent with the Aluminum Castings Company of Detroit, Michigan.

In 1921 Mr. Reardon organized the National Alloys Company of Detroit, of which he is president. Since organizing the National Alloys Company he has succeeded in perfecting a permanent mold for bronze and aluminum castings. This company specializes in the production of alloy castings of brass and aluminum and in the manufacture of acid resisting alloys in both casting and ingot form. Mr. Reardon was the first successful maker in this country of pure copper castings of high conductivity and his company is especially well equipped to do this kind of work.

M. G. CORSON

M. G. Corson for four years non-ferrous Research Metallurgist with the Union Carbide and Carbon Research Laboratories recently resigned his position.

Mr. Corson is a graduate Chemical and Metallurgical Engineer, educated in two Polytechnical schools of Europe. His chief duties during his connection with the Union Carbide and Chemical Company consisted in exploring new fields of applications for the products of the Electro Metallurgical Company, namely, chromium, manganese and silicon. In this direction he succeeded in developing a group of copper base alloys containing silicides of either chromium, iron, cobalt or nickel in amounts of 0.5 to 7.0%, the balance being either copper or a high-copper brass, tin bronze, aluminum bronze or cupro-nickel. All these alloys are completely parallel to duralumin in their amenability to hardening by heat treatment. A unique feature of Corson alloys (Corsonites A, B, C and D) consists in the combination of high strength (up to 115,000 lbs., and 13% elongation) with a high conductivity (50 to 80% of the copper standard), not met in any other alloy known.

Mr. Corson succeeded also in developing a line of high manganese-copper alloys in the wrought form, which not only show a high electric resistivity but also a very strong resistance to the oxidizing types of wet corrosion.

While still residing in his native country, Russia, Mr. Corson was active in the development of the copper alloys—metallurgy, copper scrap recovery in the refining of platinum ores, and also in the manufacture of pharmaceuticals, (salicylic acid, aspirin, resorcinol, guayacol, etc.). In the last line he was directing extensive research work and the development of small commercial installations.

Mr. Corson made an extensive study of aluminum alloys and his book on this subect is being published by the Van Nostrand Company of New York. Another manuscript of his, covering the old and new alloys of copper, is now being considered for publication by the Union Carbide and Carbon Company.

Mr. Corson is planning to engage in consulting work in non-ferrous metallurgy and industrial chemistry.

Charles M. Smillie, formerly with the Ternstedt Manufacturing Company, Detroit, is now connected with the A. C. Spark-Plug Company, Flint, Mich., as production engineer.

Charles J. Goehringer has severed his connection with and disposed of his interests in the Buckeye Products Company, Cincinnati, Ohio, and joined the J. E. Linck Sheet Metal Works, Philadelphia, Pa.

S. F. Murphy, Jr., well known among industrial plants on the Pacific Coast and in the Orient, has joined the service department of the Quigley Furnace Specialties Company, Inc., manufacturers of hytempite, acid-proof cement, Quigley refractory gun, triple-A solutions, etc. Making his headquarters at San Francisco, Mr. Murphy will cover the entire west coast, California, Colorado, Texas, Utah, Oregon, Washington, Wyoming, British Columbia and the Orient.

J. N. Joyce has joined the Cleveland office of the Bridgeport Brass Company, located at 2017 Superior Viaduct, for the purpose of soliciting sales on Bridgeport-Keating flush valves and plumrite brass pipe. Mr. Joyce is a graduate of the University of Cincinnati, a Major in the Officers Reserve Corps, Aviation, and is familiar with the architects and plumbing contractors in the Cleveland territory. Before coming with the Bridgeport Brass Company, he was associated with the Johns-Manville Company.

Obituaries

EDWARD S. MOWRY

Edward S. Mowry died May 16, 1926. He was general manager of Wilcox, Crittenden & Company, Middletown, Conn.

He was born Sept. 22, 1871, in Cambridge, Mass., the son of the late Charles D. Mowry and Sarah E. Mowry. When he was three years old, the family removed to Middletown, where his father took charge of the galvanizing and tinning departments at Wilcox, Crittenden & Company, Inc. From a small department employing four men, Charles Mowry built this department to one employing around forty men. Upon his death in 1907, Edward S. Mowry was given charge of the galvanizing and tinning departments. He entered the employ of Wilcox, Crittenden & Company, Inc., under his father in April, 1887, and at the time of his death on May 16, 1926, had been in the employ of this company thirty-nine years and one month.

EDWARD S. MOWRY

He patented some small puzzles made of tinned castings which enjoyed a very large sale and wide popularity, the "Link the Link" puzzle being made the subject of a cartoon by Winsor McKay.

Soon after Mr. Mowdy's father's death in 1907, the plant of Wilcox, Crittenden & Company, Inc., was partly destroyed by fire. It fell to him to lay out the new plant which, at the time it was installed, was considered a very well laid-out plant. He patented several pieces of machinery used in the galvanizing department for facilitating the work, and was always interested in experimental work in the lines of hot dipped galvanizing and hot dipped tinning.

On Sept. 18, 1922, Mr. Mowry was made General Manager of Wilcox, Crittenden & Company, Inc., and acted in that capacity until the time of his death.

In addition to the machinery mentioned above he also patented several items of hardware manufactured by his company, the more popular among them being a type of stockless anchor (the Navy) and a flag pole bracket.

WILLIAM HOWARD TIMS

William Howard Tims, for a number of years superintendent and since January, 1926, general manager of the Abbott Ball Company, Hartford, Conn., died on July 17, 1926.

EMMA SAMETZ

Emma Sametz, treasurer of The Technical Press, New York, died on August 3, 1926. Her company handles the printing work of THE METAL INDUSTRY.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW ENGLAND STATES

WATERBURY, CONN.

SEPTEMBER 1, 1926.

Theodore I. Driggs, one of the vice-presidents of the **Scovill Manufacturing Company** and general manager of the American Pin Company division of the Scovill company, has resigned both positions according to an announcement by the officials of the concern. Ill health is given as the reason. Mr. Driggs has not been well for some time and for the past few months has been in the west in an effort to recuperate.

With his resignation the position of general manager of the American Pin Company division will be abolished and most of the functions of that office transferred to the general offices of the Scovill company. **George A. Goss,** who has been superintendent of the manufacturing departments of the various Scovill plants for some years has taken over the duties of general superintendent of the Pin company. It is not expected that any one will be elected vice-president of the Scovill company to succeed Mr. Driggs as the company now has three vice-presidents, two being in charge of outlying plants.

Mr. Driggs was president and treasurer of the American Pin Company when it was absorbed by the Scovill company in 1923. His father, George Driggs, and grandfather, T. I. Driggs, guided the activities of the Pin company for many years. When it was purchased by the Scovill company, Mr. Driggs was made vice-president by the Scovill company and general manager of the American Pin Company division. At the same time the American Pin Company was purchased, the Scovill company also secured the Oakville company and its president, is now one of the vice-presidents of the Scovill Manufacturing Company, and directly in charge of the Oakville company division.

The **Chase Companies, Inc.,** announce the opening of an office and large branch warehouse at Boston. This is one of several steps in a program of general expansion, F. S. Chase, president of the concern, stated.

A voluntary petition in bankruptcy has been filed by the **Electrical Appliance Manufacturing Company** through its attorney, **A. Henry Weisman.** The petition shows liabilities of $40,000 and assets of $10,000. Much of the assets consists of unfinished products. **F. E. Merrick** is the president and **F. J. Merrick,** secretary and treasurer of the concern. It manufactures electrical fixtures and small household articles. One of the reasons given for its failure is the serious fire which practically destroyed the plant about a year ago. It was three months before operations could be resumed and the amount of insurance was very inadequate to meet the damages. It lost much business during the shutdown. Referee in Bankruptcy Carleton E. Hoadley has appointed Attorney Marcus A. Weisman as receiver. It is understood that the company will make an offer to its creditors of 25 cents on the dollar.

The city has decided to take over the sewage ejection plant owned by the **American Brass Company** in the East End. The plant was built by the company in connection with the building of several hundred houses for its help during the war. Since the city has laid sewers in the district the company has been asking it to take it over for some time but the city has demurred because of the expense of operation. It has now decided, however, to take it over and operate it.

A Model Home being built in the Robinwood section by the Republican and American is being equipped with locally made brass fixtures. Copper shingles made by the Ansonia branch of American Brass Company, semi-annealed brass pipe for plumbing made by the local plant of the American Brass Company and a Hoffman vapor heating system are among them. The Hoffman Company has its office and most of its products are made in a section of the Scovill Manufacturing Company devoted to its use.

Mortimer Doran of this city has patented and put on the

market a quick-set adjustable window shade and curtain holder, made of solid brass and steel nickel plate.

E. O. **Goss,** president of the Scovill Manufacturing Company, is a member of the Connecticut Council of the New England Conference which is now conducting a special survey of industrial, commercial and agricultural conditions in the state.

William H. Bristol, president of the **Bristol Company** and other officials of the company have appealed to the city government to construct a new bridge on the street leading to their plant, claiming the present one to be unsafe for the cartage of their freight to the railroad.

Ralph K. Mason has retired from the presidency and part ownership of the **Trumbull-Vanderpoel Electric Manufacturing Company** of Bantam and sold his stock. He has been succeeded by Harmon J. Cook of Torrington.

Approximately 135 members of the **Scovill Foremen's Association** attended the annual outing at Champ's farm near Bridgeport, last month. The committee in charge was: Chairmen, M. U. Lowe, Joseph Looser, William McGowan, John Brady, Ward Hobbie, Stanley Sunderland, Louis Willard, Edward Hemlock, Joseph Byrnes, Henry Davidson and Rudolph Ringenberg. John Robinson, president of the association, served in a supervisory capacity. Ivan Coulter's baseball team defeated Bill Cleary's team.—W. R. B.

BRIDGEPORT, CONN.

SEPTEMBER 1, 1926.

Carl **F. Dietz,** president of the **Bridgeport Brass Company,** has returned from a trip to Florida. At a meeting of the Rotary club last month, he described his trip and talked of conditions in that state following the collapse of the land boom. In spite of this collapse, he said, building is going on to a large extent and farmers from the west are coming there and taking up farms.

The new city directory, just completed, shows about 450 manufacturing establishments in the city. These plants produce some 5,000 commodities, many of them known throughout the civilized world, it states. These industries employ about 50,000 workers and have annual production of $240,000,000. The city ranks fourth among all the cities of the country in health standing.

The **General Electric Company,** last month, paid to the workers of its local plant, $14,340.58 in supplementary compensation for such employes who have been with it for five years or more. The sum represents five per cent of the earnings of the employes for the six months' period ending June 30. The total paid by the company to its employes in all its plants amounted to $1,396,000. It was paid either in cash or in GE Employes Securities Corporation bonds, the latter bearing interest at eight per cent so long as the employe remains with the company.

A record contribution for the **Employe's Tuberculosis Relief Association** was donated by employes of the **Singer Manufacturing Company,** last night. Their donation was $1,305.25, breaking all previous records by nearly $300. The Automatic Machine Company, McCathron Boiler Works, Grant Manufacturing and Machine Company, Cornwall and Patterson Manufacturing Company, Challenge Cutlery Company, Bridgeport Screw Company and Union Specialty Company are other factories whose employes have contributed.

A newly arrived manufacturer, **A. Cohen,** manager of the **Favorite Manufacturing Company** has asked the police department to assign a policeman to guard his factory against acts of violence that he feared might result from picketing in front of his shop.

Max Ams, Jr., was given first prize as association champion on aggregated points in the sporting events of the annual outing of the Manufacturers' Association, last month. J. **Krevitz** won second place and **A. Winter,** third.

The Manufacturers' Association of Stamford, through its president, **Joseph A. Horne,** an official of the **Yale & Towne Company,** has issued a statement branding as "fallacious and misleading" the claim made by Town Counsel Frank Rich that the manufacturers are being assessed at absurdly low values and that the burden of taxation is on the shoulders of the smaller taxpayers. The statement also defends the assessors against what it terms "undeserved charges" against them.—W. R. B.

TORRINGTON, CONN.

SEPTEMBER 1, 1926.

Business is good. That is the general opinion expressed by Torrington manufacturers when approached by a representative of THE METAL INDUSTRY. Practically all the shops are working full time and few workers are idle.

Announcement was made during the past month of the retirement of **Charles H. Alvord** as president of the **Hendey Machine Company.** Mr. Alvord has been with the Hendey company about 30 years and president since 1919. No statement has been issued as to his probable successor.

Charles A. Parmalee, for 39 years engaged at the **Union Hardware** plant, dropped dead of heart disease August 23 while employed at his duties. Mr. Parmalee leaves his wife and one daughter. The funeral was held August 25 with burial in Torrington.

William R. Kohrs, 29, for the past ten years employed in the employment office of the Torrington branch of the **American Brass Company,** died August 1 at his home after a brief illness following a nervous breakdown. He was born in New York, but spent practically all his life in Torrington.

The **Trumbull-Vanderpoel Electric Manufacturing Company** of Bantam has increased its capitalization by issuing 13,680 shares of seven per cent stock.

On application of the Litchfield National Bank and **Nellie M. Rogers of Bantam,** Judge Dickerson of the superior court has appointed **William W. Gager** of Waterbury receiver for the Bantam Ball Bearing Company for a period of four months. The petition stated that the company was solvent but its operation as a going concern had been suspended because of an attachment made for $200,000 in favor of the **Wellworth Automotive Corporation.**—J. H. T.

NEW BRITAIN, CONN.

SEPTEMBER 1, 1926.

Business conditions in New Britain continue along the even tenure of their way and the waning of summer and advent of falls finds little change and no reason to believe that there will be any.

A survey of all of the leading factories shows that business has held up remarkably well during the summer months, that demand for builders' hardware, both tools and finishing equipment, has been brisk, and that everything points to a continuation of good business throughout the fall and early winter. While not desiring to predict too far ahead, officials say there is every reason to believe that this fall will see no diminution of employment or production here.

Landers, Frary & Clark, probably the largest individual concern, continues to add to its building space and production equipment and now advances into one of its most busy periods, the pre-holiday season. With a vast assortment of electrical equipment, silverware and cutlery and also a big output of domestic aluminum ware, Landers, Frary & Clark is speeding up production in expectation of the usual demand.

The **P. and F. Corbin Branch** of the **American Hardware Corporation** finds business good, especially in its builders' hardware such as window fasts, door checks, locks and transom rods. The **Russell and Erwin Branch** is also busy, and builders all over the country are demanding their door locks, plates, etc., in large quantities. The **Corbin Screw Corporation** likewise is busy.

Business at the **North & Judd Manufacturing Company** seems to be showing improvement. The **New Britain Machine Company,** which a couple of years ago hit the bottom and then began the slow climb back toward the pinnacle, continues to steadily improve in its business. Its financial statement is exceptionally good and this concern is staging a real comeback.

The **Union Manufacturing Company** and the **Skinner Chuck Company,** always fairly steady, continue to hold their own in their field.

There is practically no unemployment in this city and while their is no opening for a floating population, laborers and artisans located here find plenty of work.—H. R. J.

PROVIDENCE, R. I.

SEPTEMBER 1, 1926.

With the vacation period over, with its accompanying inventories and overhaulings of plants and machinery, the manufacturers are prepared for increasing business activities during the remaining months of 1926. The various building lines which have been above the normalcy standard since the beginning of the year promise to continue active for an indefinite period. It is many years since there has been so much activity in the building lines in Providence as at present. With a twenty-three story business block to cost some $3,000,000 and a new Masonic Temple to cost $2,500,000 and any number of smaller projects the outlook is very satisfactory. In the jewelry lines, the indications are favorable, although not so encouraging as in the building lines. However, the satisfactory report and optomistic indications shown at the big conventions of the Wholesale Jewelers' Association and the American Retail Jewelers' Association at Philadelphia the early part of this month have stimulated the manufacturers to putting forth renewed efforts that promise well for the balance of the year. Small tool industries which have been slack for some time are also responding to the improved conditions in the other branches.

The **Atlas Sheet Metal Company** and the **Atlas Metal Ceiling Company, of which Gustave T. Kollen** is president and treasurer, are now located in new and larger quarters at 828-830 Eddy street, to which they have removed from 237 Eddy street. The contracts for sheet metal and metal ceiling work was never more active with them than at present, while contracts for other lines are being booked.

The **Rhode Island Wire Works, Inc.,** 45 Willard avenue, Providence, have the contract for all the wire work including vent grills, screens, brass pipe railings, etc., in the new Pawtucket High School.

Fifty-five corporations engaged in the metal trades of Rhode Island, or directly or indirectly affiliated therewith, are assessed on a corporate excess of $100,000 or more, totalling $25,894,680.55 by the levy of the State Board of Tax Commissioners made public early the past month. Revenue amounting to $1,878,418.12 will be derived by the State Treasury this year from the assessment on the corporate excess and franchise taxes of manufacturing, mercantile and miscellaneous corporations, according to the commissioners' list. The total corporate excess taxable this year is $318,191,530.60.

The **Barton-Taylor Jewelry Company** has been incorporated under the laws of Rhode Island with an authorized capital consisting of 500 shares of common stock without par value to engage in the manufacture of a general line of plated jewelry and novelties. The incorporators are **Everett A. Barton**, formerly connected with the manufacturing jewelry concern of **E. A. Barton Company,** now out of business; **William H. Taylor** of the toolmaking firm of **W. H. Taylor & Son** and **Irving J. Law.**

Henry A. Lincoln, president of the **F. W. Morse Tinware Company,** manufacturers of tinware of every description, and formerly a partner of the manufacturing jewelry concern of **Reed & Lincoln,** died at his home 22 Rhode Island avenue, Providence, on Aug. 9, following an illness of about two years. He was in his 69th year. He is survived by his widow and one son. He was born in Attleboro, Mass., Feb. 15, 1858, and began his business experience with his father, the late George M. Lincoln, in the firm of S. T. Lincoln & Company, electroplaters, at 14 Page street. In 1890 the deceased withdrew from his father's firm and with William A. Reed established the manufacturing jewelry concern of Reed & Lincoln, which continued until 1908, when it dissolved, and Mr. Lincoln became associated with his brother-in-law in the F. W. Morse Tinware Company.

The **Flint, Blood Corporation** has been incorporated by Maurice Robinson, Charles H. Robinson and Ravid C. Adelman, all of Providence, for the purpose of manufacturing and dealing in jewelry and novelties under the laws of Rhode Island. The authorized capital of the concern is 500 shares of common stock without par value.—W. H. M.

MIDDLE ATLANTIC STATES

ROCHESTER, N. Y.

SEPTEMBER 1, 1926.

There is very little to report relative to the business situation among Rochester manufacturing institutions. The latter part of July and the closing month of August has witnessed more real activity than during the same period a year ago. Production during the heated term has been very steady, and altogether, manufacturers declare August has been a good month.

Brass foundrymen throughout the city report continued activity in all lines, particularly "small job work." Consequently, the demand for copper, brass sheets and rods, aluminum and lead is much firmer than in recent years.

The outlook for fall and winter months is very promising, according to testimony of several superintendents and purchasing agents of the larger industrial plants about the city. Electro-platers have had a busy season this summer, and in spite of the handicap of depressed business in February and March the platers report that the season of 1926 to date is much ahead of that of the past four years.

Announcement that the **Rochester Gas and Electric Corporation** is to supply its customers with musical programs by radio through the utilization of its own lines is creating great interest the country over. The method to be employed is that of wired-wireless, and, with equipment supplied by the corporation, will bring radio programs into the home through an attachment that can be plugged into an electric light socket. The equipment will be manufactured in Rochester.—G. B. E.

NEWARK, N. J.

SEPTEMBER 1, 1926.

Prosecutor John Milton and **Thomas E. Fitzgerald** have been appointed equity receivers by Judge Runyon for the **R. E. Thompson Manufacturing Company,** of Jersey City, N. J., manufacturers of radio appliances. Mr. Fitzgerald is treasurer of the company. The court ordered the receivers to conduct the business until further notice. One of the principal reasons for the appointment of receivers is the fact that a suit for $100,000, alleging breach of contract regarding the sale of radio appliances in New Jersey, has been brought in the Supreme Court. The authorized capital stock of the company consists of 30,000 shares of preferred stock. The liabilities of the company are set at $53,081.32 and assets at $428,000. Consent to the receivership was filed by the officers of the company.

Newark concerns incorporated include: **Unitron Electric Company,** manufacture electric appliances, 5,000 shares; **Essex Plumbing and Heating Company,** $100,000, plumbing supplies; **Elmer E. Gardner, Inc.,** electrical supplies, 500 shares no par; **M. S. P. Corporation,** manufacture electrical supplies, 2,500 shares; **Electric Medical Corporation,** manufacture electrical devices, $125,000; **Mercer Products Corporation,** radio appliances; **Fleming & Company,** manufacture silverware, $50,000; **Newark Electrical Supply Company,** electrical supplies, $300,000.

Vice Chancellor Bentley had directed creditors and stockholders of the **Lamp & Wire Products Company** and the **Yunck Glass Manufacturing Company,** both of West Orange, to show cause why the accounts of **John Drake,** receiver for both, should not be approved. Mr. Drake continued the lamp concern, but was unable to make it go.

The **New Jersey & Connecticut Dri-Steam Valve Sales,** Inc., of Paterson, N. J., has been chartered at Trenton with $50,000 capital, to manufacture steam valves, etc. **Combination Selector Company,** of Montclair, N. J., was chartered with $30,000 capital, to manufacture mechanical instruments. **Wave Cut File & Tool Corporation,** of Jersey City, has been chartered with 1,000 shares, to manufacture files and tools. **H. and T. Battery & Ignition Company, Inc.,** of Newark, has been chartered with $100,000 capital, to deal in batteries. **Union Storage Battery Company,** of North Bergen, has been chartered with $5,000 capital, to deal in batteries. **Schroeder** Sheet

Metal **Works**, of Irvington, was chartered with $50,000 capital, to deal in metal products. **Permex Corporation of America**, Jersey City, has been chartered with 1,000 shares no par value, to deal in metals, etc.—C. A. L.

TRENTON, N. J.

SEPTEMBER 1, 1926.

All branches of metal industry show signs of improvement and manufacturers feel encouraged over the outlook. Some of the firms report that while the new orders are not large ones yet they are coming more steadily. **William G. Wherry**, president of the **Skillman Hardware Manufacturing Company**, says that the summer months have been a little quiet, but that business is beginning to improve. The Skillman company, the only lock and hardware concern here, manages to run steadily without laying off any hands. The **John A Roebling's Sons Company** and the **Jordan L. Mott**, two of the largest concerns in this section, are running on full time.

The **Winchester Repeating Arms Company**, of New Haven, Conn., has entered into a working agreement with the **United States Cartridge Company**, of Perth Amboy, N. J. The agreement is for the Winchester company to turn out loaded shells and ammunition for the Perth Amboy concern and the latter will probably close up its plant but will continue its sale's force throughout the country.

Ferdinard W. Roebling, Jr., vice-president and treasurer of the John A. Roebling's Sons Company, has been elected president of the concern, to fill the place caused by the death of Colonel **Washington A. Roebling**. At the reorganization meeting **William A. Anderson** was chosen to succeed Mr. Roebling. No other changes were made. By reason of his technical training Mr. Roebling is admirably fitted for the position. Mr. Roebling was associated with his late uncle, Charles G. Roebling, in the engineering department of the Roebling company after leaving college.

Colonel Washington A. Roebling, president of the John A. Roebling's Sons Company, who died recently, left an estate of $20,000,000, according to his will filed at Trenton, N. J. The sum of $50,000 is left to Rensselaer Polytechnic Institute, Troy, N. Y., and $40,000 to Trenton hospitals. His mansion is left to his widow with $100,000 to be invested and the income used to meet the taxes upon the mansion. Colonial Roebling was buried at Cold Spring, N. Y.—C. A. L.

PITTSBURGH, PA.

SEPTEMBER 1, 1926.

Industrial operations in Pittsburgh and Western Pennsylvania are slightly lower, as is customary at this season. Manufacturers of sanitary goods and radiators are fairly busy, but buying for local consumption is slow, and many plumbers are not working. Electrical equipment manufacturers are moderately active and demand for radio equipment is improving.

Hardware trade continues in moderate volume. Building material is not very active, industrial demand being below normal.

The dollar value of trade, as shown by check payments, was larger during the second week of August than during the corresponding period a year ago, according to the weekly statement of the Department of Commerce. The distribution of goods, as measured by carloadings, during the first week of August was likewise larger than a year ago.

The New Castle foundry of the **Stove and Range Company** of Pittsburgh, which has been closed down since April, will resume operations in a few days, according to local officials.—H. W. R.

MIDDLE WESTERN STATES

CLEVELAND, OHIO

SEPTEMBER 1, 1926.

Expansion of metal plants in Ohio and the incorporation of several new concerns is indicative of the prosperous condition of the industry.

The **American Crucible Products Company**, Elyria, Ohio, manufacturers of bearings and metals, will move its plant to Lorain by Sept. 15, occupying the former plant of the **Hoffman Heater Company**, and enlarging its working force to 65 men. Reorganization of the business is contemplated and it is planned to increase the working capital to $425,000. The company was established seven years ago and now markets 37 kinds of bearings. Its specialty is "Promet" a heated-treated bronze bearing metal containing lead. With the enlarged plant in Lorain the addition of several new products are contemplated. E. M. Wickens and G. L. Smith, Lorain, and A. C. Smith, president, Elyria, are on the board of directors.

A five-story, brick and stone-trimmed administration building will be erected at Mansfield, Ohio, this fall by the **Ohio Brass Company**. Plans have been drawn by Althouse & Jones, Mansfield architects, calling for a 255 by 52 foot structure of skeleton steel, with reinforced concrete floors, and contracts will soon be awarded. The new building will include many innovations. Pneumatic tubes will connect all floors and also the new building with the factory and engineering buildings. A complete museum in which a full line of the company's products will be on permanent display will be equipped on the ground floor. A conference room for sales meetings, etc., seating 350 will be on the fifth floor. Ample provision has been made for future growth; stories may be added as needed. The structure will be used for business offices only. The factory office building of the company was enlarged and renovated last year.

The building will be erected on the site formerly occupied by the **Altman & Taylor Machinery Company**, between Main and Diamond streets, adjacent to the present group of office and factory buildings.

Volume 20 of the **Ohio Brass Company** catalog has been issued, containing 950 pages and listing 4,300 items manufactured by its plants in Mansfield and Barberton, Ohio, and at Niagara Falls, Canada. The company's first catalog, issued in 1904, contained 12 pages.

The **Roether Foundry Company**, 903 E. Third street, Dayton, O., has acquired 85,000 additional square feet of floor space by leasing the plant of the Barney & Smith Car Company, Dayton. New contracts and a general increase in business demanded the enlargement, according to Charles C. Roether, president.

A five-year lease has been obtained by the **Braden Plating & Manufacturing Company**, 1895 W. 58th street, Cleveland, on a building at 1473 W. 110th street, containing 8,000 square feet of floor space. Additional business made the move necessary.

Metal plants which have received incorporation paper from the state during the last month, include:

The **A. B. C. Brass Manufacturing Company**, Cleveland, $10,000. Incorporators: N. I. Stone, A. Boerder, B. H. Schwartz, R. R. Levenson and J. L. Stetser.

The **Midwest Metal Art Company**, Cincinnati, $75,000. Incorporators: E. Meirjohan, H. Meirjohan, D. N. Rosebaum, Charles Rodner and A. Kraus.

The **Ohio Valley Metal Art Manufacturing Company**, Shadyside, $4,500. Incorporators: T. Meyer, L. F. Exner, S. Walters, C. Meyer, E. R. Ward and P. Jones.

Elmer F. Scott, 1677 Belmar road, Cleveland, has published a textbook on foundry equipment through the International Text Book Company. The book will be used in course in technical and engineering colleges. Scott has spent several years in the study of plant and foundry layout, design and equipment, and foundry production methods.—S. D. I.

DETROIT, MICH.

SEPTEMBER 1, 1926.

But little change is seen yet in the general copper, brass and aluminum industry. The mid-summer slackness in many other lines is decreasing and it is believed now by almost everyone that the non-ferrous metals will soon fall into line. Practically all of the plants are operating, but none are producing at the rate they did a year ago at this time. It is generally believed business will be more or less retarded throughout the fall and perhaps well into the winter. Much, however,

depends on the automobile industry which, at present, is not making the advancement it did last year.

W. C. Ireland has been made general manager of the **Ireland & Matthews Manufacturing Company,** of Detroit. **Thomas Keefe** has been made general manager of sales.

It is stated that the **American Enameled Products Company** will place six carloads of new equipment in its branch factory at Mt. Pleasant, Mich.

The **Gibb Welding Machine Company,** of Bay City, is building an addition which will practically double its factory space. The Gibb product issued by Dodge Brothers, General Motors, Ford Motor Company and other motorcar organizations.

The appointment of **Garrison Ball,** formerly vice-president and sales manager of the **American Bronze Corporation,** Berwin, Pa., as field secretary of the Motor and Accessory Manufacturers' Association, has been announced by **M. L. Heminway,** general manager. His work will be in addition to that of **H. J. Quirk,** field secretary in charge of the branch office in Detroit, whose activities, it is stated, are largely in the interest of the credit department.

The **West Michigan Brass Company** at Zeeland, Mich., has increased its capital stock from $50,000 to $75,000.

Peter Alexander Macdonald, president of the **Wolverine Enameling Company,** died recently at his home in Detroit. He was born in Woodstock, Ont., in 1862, and came to Detroit 25 years ago. He had been president of the Wolverine Enameling Company for the last four years. His widow survives.—F. J. H.

CHICAGO, ILL.

SEPTEMBER 1, 1926.

Chicago's first annual jewelry and allied trades' show will be held Sept. 20 to 24, under the auspices of the Wholesale Jewelers' Association of Chicago, in the Jewelers' building, the latest addition to Chicago's skyscraper family, on Wacker drive and Wabash avenue.

P. T. White of **Otto Young & Company** is chairman of the committee which has the first annual jewelry show in charge. All classes of goods sold by the Jewelry trade will be exhibited.

Lantz, Inc., 906 Irving Park boulevard, has been granted a charter and capitalized at $25,000, to engage in and conduct a general manufacturing and sales business to engage in glassware, copperware, electric fixtures, etc. The incorporators are Samuel H. Gilbert, Paul F. Hoerman and Thomas B. Hammer. The correspondents are Gilbert and Baker, 70 South Dearborn street.

The **Blanke Auto Devices, Inc.,** 247 East Illinois street, has been granted a charter and capitalized at 200 shares, non par value, to manufacture and deal in automobile parts and accessories of every kind. The incorporators are William H. King, Jr., B. L. McManus and M. K. Fitzpatrick, and the correspondent is Little, Gordon, Adams and Kink, 203 South Dearborn street.

Emil Seiler, Inc., 1728 South Halsted street, has been granted a charter by the secretary of state and capitalized at $30,000, to manufacture and deal in beverage accessories, plumbing brass finishing goods, pumps, cabinet coolers, work boards, etc. The incorporators are Emil Seiler, Carl Heid and Barbara Heid. The correspondent is Kirk and Thorsness, 10 North Clark street.

National Electric Company, 1211, 77 West Washington street, has been granted a charter and has been capitalized at $100,000, to manufacture and deal in electric appliances. The incorporators are E. J. Lundin, A. E. Matz and K. B. Anderson, and the correspondent is Harry A. Beissat, 1211, West Washington street.—L. H. G.

OTHER COUNTRIES

BIRMINGHAM, ENGLAND

AUGUST 16, 1926.

The Birmingham metal trades have stood up remarkably well to the effects of the coal strike. Most of the sheet and tube rolling works are operating five days a week, and the loss of the sixth day is due purely to the lack of fuel. Several of the largest works making wire from copper, brass or similar material have remained in full operation, since the short stoppage which followed the declaration of the coal strike. French competition in wire is keen, but several times recently British manufacturers have met it successfully. Large quantities of copper or brass wire are being produced in Birmingham for the fancy bangle trade of Africa.

The chief deficiency in non-ferrous requirements arises from the practical stagnation of shipbuilding, in which industry most of the yards are closed. That trade was steadily recovering when the pits closed down, and it is believed would by this time have supplied excellent orders to Birmingham. It is hoped that these will come later in the year, and the city expects to get a share of the business in non-ferrous fittings, in connection with the engines and furnishing of these modern ships.

Several manufacturers of galvanized hollow ware in the Birmingham area look forward confidently to a boom later in the year. When the pits closed, the principal works had orders booked sufficient to keep them employed for several weeks, and there was an improving demand for nearly every kind of container.

Aluminum hollow ware is a growing Birmingham trade. Foreign competition has been very severe, not only in open markets, but in this country. It is believed that the general user increasingly prefers the heavier and stronger British product to the light material turned out at lower prices on the Continent. The British maker believes that the time is approaching when a lot of the foreign trade will be recovered, on the ground of price as well as in quality.

In enamelled ware, a striking feature is the adaptation of enamelled ware to toilet vessels, in which the attractive colors and shapely forms offer increasing competition with pottery ware of the old type. The makers of tin containers have plenty of orders, but are handicapped chiefly by the inability to get the necessary tinplate.

The Birmingham Chamber of Commerce has lately been exercised over the possibilities of increasing business with Cuba, and have decided to ask the Board of Trade to conclude a commercial treaty on similar line to the one now being negotiated with Spain. Cuba has been a very important market of Birmingham in the past, taking numerous non-ferrous products including large quantities of brass and copper goods to meet domestic or industrial requirements. Since the war very little has been done, and the Birmingham merchants frankly admit that nothing is likely to shake the hold on that market obtained by the United States during the war. They are fully alive to the advantage arising from America's large purchase of sugar from Cuba, while the voyage from America occupies only four days as compared with 16 or 17 days from this country.

Hardly any trade is being done in electro-plate and sterling silver, and the Birmingham jewelry trades continue more than usually dull, although August is invariably a quiet month. This trade has suffered severely from the modern fancy for motoring, golfing, etc., and the general devotion to sport which has diverted the feminine taste in new directions to the neglect of the old fashioned personal decoration which brought so much business to the city in the past. Steps are being taken by the Birmingham Jewelers' and Silversmiths' Association to legalize certain standards of gold, silver and platinum, the bill now before Parliament giving exact definition of such terms as "gold front," "rolled gold," "gold filled" "gold shell," "gold cased," "fire gilt" or "mercurial gilt," and there is every hope that this bill will eventually get through Parliament, too much pre-occupied so far, however, with other questions to deal with measures of practical industrial value. The association is preparing a booklet giving a full list of trade marks and trade punches used in the United Kingdom. At least 10,000 marks are registered by the association, of which about 5,000 are British and the balance French, Swiss, German and American.—J. H.

Business Items—Verified

The **Detroit Stove Works,** Detroit, Mich., are installing new electric floor fork, made by the Ferro Enamel Supply Company, Cleveland.

Moore Brothers Company, Joliet, Ill., is installing new porcelain enameling furnace. Installation is being made by the Ferro Enamel Supply Company, Cleveland.

The **Bennett Brass Company,** Greenville, Mich., has awarded the contract for a 55 x 55 ft. one-story addition to its foundry. The company is enlarging its line of plumbers' brass goods and specialties.

L. D. **Goddeyne,** Bay City, Mich., operating a metal plating works, plans the erection of a one-story addition. This firm operates the following departments: galvanizing, brazing, plating, tinning polishing, lacquering.

On July 24, the New York office of the **Bridgeport Brass Company** moved from the Pershing Square building to the Farmers' Loan and Trust Company building, Suite 407, 475 Fifth avenue, at Forty-first street.

Magnuson Products Corporation announces that due to the growth of its business necessitating enlarged facilities, it has purchased the property at the corner of Third and Hoyt streets, Brooklyn, N. Y., and moved to the new quarters.

The **Specialty Brass Company** has moved its Kenosha works and office into a new plant situated on the Sheridan road just north of the city of Kenosha, Wis. This firm operates the following departments: brass, bronze, aluminum foundry; brass machine shop, tool room, plating, polishing.

Ohio Valley Metal Art Manufacturing Company, Shadyside, Ohio, is erecting a plant for the manufacture of metal products. This firm makes and designs metal art work and expects to make lighting fixtures, stair railings, grills, gates, flower stands, smoking stands, mirror and picture frames, etc.

Akron Brass Manufacturing Company, Wooster, Ohio, is building an addition to its plant. The offices are to be removed to the new addition to the west side. This firm operates the following departments: brass, bronze and aluminum foundry; brass machine shop, tool room, grinding room, plating, soldering, polishing, lacquering.

M. & H. Valve and Fitting Company, Anniston, Ala., has announced an increase in the capital stock to $300,000. This firm recently completed a foundry and machine shop. It is fully equipped and will manufacture cast iron body valves, brass trimmings and cast iron flanges and flanged fittings, adding a full brass line later.

W. H. Taylor Company, of Allentown, Pa., has been appointed distributor for Quigley Furnace Specialties Company, Inc., of New York, covering the Allentown territory for all Quigley products, including hytempite, acid-proof cement, Quigley refractory gun and triple-A protective solutions, etc., which will be carried in stock.

Eagle Oil and Supply Company, of Boston, Mass., has been appointed distributor for Quigley Furnace Specialties Company, Inc., of New York, covering eastern Massachusetts and Rhode Island, for all Quigley products, including hytempite, acid-proof cement, Quigley refractory gun and triple-A protective solutions, etc., which will be carried in stock.

The **Parker White Metal & Machine Company,** 23rd street, Erie, Pa., has tentative plans for a new three-story addition, 60 x 100 ft., to cost $35,000. W. A. Parker is general manager. This firm operates the following departments: White metal foundry, brass foundry; tool room, grinding room, casting shop, plating, japanning, stamping, polishing, lacquering.

Chief Little Bear will head the Wyandotte delegation at the Steel Treaters exhibition with the following: **J. B. Ford Company** representatives in attendance at booth No. 214. C. R. Beaubien of Detroit, C. S. Tompkins of Cleveland, P. V. Ward of Chicago, and C. S. Lee and B. N. Goodell of the Wyandotte office. The Wyandotte metal cleaners will be exhibited.

New Haven Sherardizing Company, Akron, Ohio, is installing a Udylite plant in its factory at Hartford, Conn., which will be capable of handling about five tons per day of jobbing work. There will be one automatic conveyor, one plating tank one still tank and several barrels. This unit added to its present capacity of sherardizing will give the company one of the largest rust-proofing units in the east.

Warren Balderston & Company, Greenwood avenue and Jackson street, Trenton, N. J., manufacturers of heating and plumbing equipment, etc., have arranged for an increase in capital stock, a portion of the proceeds to be used for reorganization and expansion. They have also filed notice of change of name to the Warren Balderston & Company. Officers of the company are as follows: W. O. Warren, president; H. R. Stover, vice-president; C. M. Headley, treasurer; F. Hallam, secretary.

Contract has been let by the **William Powell Company,** 2521 Spring Grove avenue, Cincinnati, Ohio, manufacturer of valves, steam specialties, etc., to the J. F. Harig Company, 1240 Queen City avenue, for a two-story addition, 122 x 145 ft., to be equipped as a foundry and machine shop, estimated to cost $200,000 with machinery. H. H. Coombe is president. This firm operates the following department: bronze and aluminum foundry; brass machine shop, tool room, grinding room, plating, polishing.

B & R Plating and Rustproofing Company, Howard and Norris streets, Philadelphia, Pa., has taken over the plant and all other assets and liabilities of the partnership which was operating as the B & R Plating Works. The new company has doubled the floor space and has installed zinc and cadmium alloy tanks and is also operating ball burnishing barrels. The original line of work of the B & R Plating Works, which was custom nickel-plating, is also being continued. This firm operates the following departments: plating and polishing.

Mayer & Loewenstein, manufacturers of Clover Leaf Brand Finishes, and one of the oldest varnish and enamel houses, which was established eighty-one years ago, announces the removal of their present executive offices after Labor Day, to their new office building located at 43 Vernon boulevard, Long Island City, New York. Mayor & Loewenstein were originally established in 1846, and their main office has been located for the past forty years at 164 Water street, New York. The company has now erected a separate office building adjoining the factory in Long Island City.

The **Kirk & Blum Manufacturing Company,** of Cincinnati, Ohio, designing engineers and manufacturers of pneumatic dust collecting, ventilating and conveying systems, announces the doubling of plant facilities through the purchase of an adjoining factory. The need for larger space has arisen principally through the development of their "contract manufacturing" department, which is handling production of sheet metal parts for many manufacturers both in the north and south. This service has proven very popular to concerns requiring high-grade sheet metal fabrication in the assembly of their products, but who do not wish to undertake the investment and problems of production of first-class sheet metal.

Niagara Falls Smelting & Refining Corporation, Buffalo, N. Y., has placed contracts for three new buildings: warehouse 60 x 55, new laboratory building 51 x 22, repair department building 46 x 34, and has called for bids for an addition to its main smelting building 60 x 65 which will make its furnace room 26 x 65. This corporation is in the market for eight new furnaces. One has been purchased from the Monarch Engineering & Manufacturing Company, of Baltimore, and two superheating furnaces from the Surface Combustion Company. The other five are being figured on now.

One electric hoist has been purchased from Chisholm & Moore, of Cleveland, where two more are being figured on. In addition to this, the company is installing 1,200 feet of overhead trackage for conveying raw and finished materials. The turntables and switches were purchased from Yale & Towne Manufacturing Company.

INCORPORATION

The **Weston Foundry and Supply Company,** New Britain, Conn., has been incorporated to operate a foundry for the manufacture of brass, bronze and aluminum castings, and has taken over the building formerly used by the C. A. Danberg Company. Charles A. Danberg is president and treasurer. This firm will operate the following departments: brass, bronze, aluminum foundry; brass machine shop, grinding room.

Industrial and Financial News

SPECIAL FOUNDRY EXHIBITS

At the Detroit Meeting of the American Foundrymen's Association, Sept. 27th to October 1st, the **Joseph Dixon Crucible Company** of Jersey City, N. J., will have the following representatives in attendance: L. W. Brower, Superintendent; R. R. Belleville, Pennsylvania and Ohio; F. R. Brandon, Chicago; R. H. Brinkerhoff, Connecticut; A. L. Haasis, Sales Manager; R. F. Leonard, New Jersey and Michigan; H. P. Smith, Jersey City; C. A. Shaw, New England.

The exhibit of **Young Brothers Company,** Detroit, Mich., at the Detroit Convention of the American Foundrymen's Association will consist of the following: a large mold oven 20'x20'x8' will form the booth, and within it they will show smaller core ovens; operating models of continuous conveyor ovens, photographs, films, blue prints, sample cores, oven accessories, and construction details. The following representatives will be in attendance, (Spaces No. 274-276, the Coliseum): George A. Young, General Manager; Robt. B. Reed, Sales Manager; V. A. Fox, Chief Engineer.

The exhibit of the **Pangborn Corporation,** Hagerstown, Md., at the American Foundrymen's Association Convention in Detroit will be in keeping with the magnitude and scope of the convention in general. Over 3200 square feet of space comprising 20 booths in solid block, will be given to exhibition of sand-blast equipment. This equipment will comprise sand-blast room, with rotative table, and overmounted dust suppression and ventilating equipment; hygienic type of cabinet; rotary tables, sand-blast barrels in direct pressure, gravity and suction types; sand-blast cabinets; hose sand-blasts, etc.

The effect and finish of the various abrasives for sand-blasting, that has become so vital to the Foundry and every industry using sand-blast, will be vividly illustrated by a Prize Contest. Cash prizes of $100, $50, and $25 will be offered for the first correct answers as to the kinds and grades of abrasive used on cast plates of gray iron, steel, brass and aluminum.

The Corporation will be represented by: Thomas W. Pangborn, President; John C. Pangborn, Vice President; H. D. Gates, Sales Promotion Manager; P. J. Potter, Works Manager; F. J. Hull, Chief Engineer; W. A. Rosenberger, Asst. Chief Engineer, and district sales engineers.

ARMY DROPS BRASS FOR BRONZE

The War Department has decided that in any future major campaigns bronze will replace brass, gold, gilt or gildine where now used in military buttons, insignia and ornaments of general use. Considerations which led to this decision were the lower visibility of bronze, its easy procurement and economy of cost. —New York Times.

METAL FIRMS WIN ADVERTISING PRIZES

At the recent exhibit and convention of the National Industrial Advertisers Association in Philadelphia, Pa., a number of prizes were taken by metal-working companies. Some of them were as follows:

For the best business paper advertisement: First prize, Niles-Bement-Pond Company, New York; second prize, American Brass Company, New York.

For the best institutional advertisement: First prize, Western Electric Company, New York; second prize, American Rolling Mill Company, Middletown, Ohio.

For the best direct mail advertisement: First prize, Graton & Knight Company, Worcester, Mass.; second prize, General Electric Company, Schenectady, N. Y.

For the best use of art in industrial advertising: First prize, Bridgeport Brass Company, Bridgeport, Conn.; second prize, Rome Wire Company, Rome, N. Y.

For the exhibit that made the best use of color: First prize, Jenkins Brothers Company, New York.

1,000,000,000 SAFETY PINS

The use of safety pins in the United States has been continually on the increase, until the present yearly output of this small but important article has reached 1,000,000,000.

About 75 per cent of all safety pins manufactured are of brass, nickel-plated. Brass wire and sheet brass are used in making them. The poundage used, exclusive of scrap, is estimated at 1,700,000 pounds of sheet brass and 4,000,000 pounds of brass wire.

What is said to be the world's largest single shipment of safety pins was made a few months ago from the plant of the Consolidated Safety Pin Company, at Bloomfield, New Jersey.

The shipment, which occupied two freight cars, consisted of 7,000,000 brass pins, having a total weight of 67,000 pounds. Approximately 500 miles of brass wire were used in their manufacture.

BRONZE AGE RELICS IN HUNGARY

Washouts due to floods on the Maros River have revealed many pre-historic objects near the Magyarcsander Bridge in Csanad County, Hungary.

They include bronze vessels, jewelry and partly burned bones which archeologists date from the early Bronze age, 4,000 years ago.

Further excavations are planned.

GOLD BEATING PROCESSES AT SESQUI

The ancient processes in the manufacture of gold leaf, which have remained unchanged for the last century, are demonstrated daily at the Sesqui-Centennial International Exposition, in Philadelphia, by master artisans of the craft. The material is hammered to the thinness of .003 inch.

James Donnelly, who became an apprentice gold beater in the year of the Centennial Exposition in Philadelphia, a half century ago, may be seen wielding an eight pound hammer which flattens the gold to a transparent thinness. His daughter, Fannie Donnelly, cuts the sheets with a "wagon," makes them perfect with reed pincers, and lays the fluttering leaves between rouged paper, ready for use.

BRONZE STATUE FOR SAFETY PRIZE

A bronze statue was presented to the Ashland, Ky., blooming and bar mill department of the American Rolling Mill Company, on July 10, 1926, as a result of its having made the best safety record of any of the company's eighteen groups for the year 1925. The accident severity rate of the American Rolling Mill Company was reduced from 3.32 percent in 1924 to 0.75 percent in 1925 as the result of an intensive safety campaign. The trophy is the work of Clement J. Barnhorn, Cincinnati.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America	..	$68	$71
American Hardware Corporation	$100	81	83
Anaconda Copper	50	50½	50⅝
Bristol Brass	25	4	7
International Nickel, com	25	37⅞	38
International Nickel, pfd	100	102	..
International Silver, com	100	91½	94
International Silver, pfd	100	103	108
National Enameling & Stamping	100	29½	30
National Enameling & Stamping, pfd	100	81½	85
National Lead Company, com	100	158	160
National Lead Company, pfd	100	117	118
New Jersey Zinc	100	191	195
Rome Brass & Copper	100	125	135
Scovill Manufacturing Company	..	238	243
Yale & Towne Mfg. Company, new	..	69	70⅛

Corrected by J. K. Rice, Jr., Co., 120 Broadway, New York.

COPPER IN 1924 AND 1925

Final statistics of the production of copper in the Uinted States in 1924 and 1925 are issued by the Department of Commerce in a statement which has been compiled in the Bureau of Mines. The smelter production of copper from domestic ores showed a small increase in 1925 and established a new peace time production record. Refinery production from domestic sources also increased, but refinery production from foreign sources decreased sufficiently to make the total new refinery production for 1925 lower than that for 1924. Imports of unmanufactured copper and exports of metallic copper also decreased. Domestic withdrawals of new copper increased in 1925 and stocks of refined copper were only a little over one-half as large as stocks at the end of 1924. Blister stocks showed an increase. The average price of copper in 1925 was a little over 1c a pound higher than in 1924.

Review of the Wrought Metal Business

Written for The Metal Industry by J. J. WHITEHEAD, President of the Whitehead Metal Products Company of New York, Inc.

SEPTEMBER 1, 1926.

Except for some developments in the refrigeration industry during August, there were no changes of any importance to be noted in the brass, copper and nickel alloy business generally. Some of the large refrigerating machine manufacturers have suspended operations temporarily for one reason or another, and have instructed the mills to hold up shipments for a month or two. It is understood that there are some changes being made in the design of machines, and that the refrigerator people have taken advantage of the season's end to perfect their new models. Also there is naturally a slackening in this line at this time of the year, and after the terrific activity for many months, some of the largest factors are reviewing their position and making plans for a fresh start for the coming year.

The hold up on deliveries of sheet copper and copper tube and Monel metal for this line has of course released some of the tension on the mills producing these items, and helped deliveries into other lines.

As the whole run of business has been holding up well, the mills are still running full, and deliveries are somewhat improved. It is not anticipated that the slowing down in the refrigerator line is other than temporary, with the expectation that when they start again it will be on a scale much greater than heretofore. In view of this belief the mills are getting ready for a heavy rush of business this Fall, with the feeling that all facilities will be overtaxed to keep up with the demand.

Building operations in the East where most of the copper for roofing is consumed are still in an active state with the demnad as heavy as ever.

Producers of Monel metal and nickel report that they are satisfied with the situation. The textile trade in some lines has been calling for large quantities of Monel metal for dye house equipment, and the laundry machine manufacturers have continued to be large consumers. The large number of hotels and apartment hotels being erected throughout the country have required kitchen equipment in great quantities, and as practically all of these kitchens are being equipped with Monel metal and nickel, the requirements of this line also have been very large.

With all the consuming lines in a prosperous conditoin the demand on the Monel metal and nickel producers has been heavy and they are expanding their facilities to turn out their products in still greater volume.

There is, however, a general feeling of caution in the air, and as a consequence stocks are being held to a low level with little or no forward buying. This is no doubt a good sign and makes for a healthier basic condition.

Metal Market Review

Written for The Metal Industry by R. J. HOUSTON, of D. Houston & Company, Inc., Metal Brokers, New York.

SEPTEMBER 1, 1926.

COPPER

Market strength in August was maintained close to the electrolytic level of 14⅜c @ 14½c, with some slight concessions from these figures incidental to some realizing sales by custom smelters and dealers. Large producers, however, are well sold ahead and were not inclined to press sales whenever there was a falling off in new business. Prices throughout the month were consequently steady much of the time even when there was a decidedly narrow market.

Underlying conditions in the copper situation are essentially sound, while the impressive activity of the brass industry is an outstanding feature. The mills of the country continue to operate at high levels. A continuation of the present high rate of manufacturing activity is confidently looked for, and market conditions should reflect the favorable developments leading up to the greatly increased consumption of copper. The volume of distribution, as indicated by total shipments of 1,640,830,000 pounds during the first 7 months of this year on domestic and foreign orders, clearly reveals the magnitude of new requirements. The trend of the industry is also seen in the fact that stocks of refined copper have been reduced to the lowest level in many months. It is good opinion therefore that market conditions should remain exceptionally favorable during the balance of the year.

ZINC

There was a decrease of 2,774 tons in domestic stocks of zinc in July. Production showed a slight increase of 177 tons over the June output. Total shipments for the month of July amounted to 51,177 tons, against 52,400 tons in June. Stocks on July 31 were 22,986 tons, being the smallest since March when they were 20,561 tons. There was a good consuming demand for zinc in August with galvanizers and brass manufacturers' buyers in heavy volume. Ore sales were on a large scale at $50 per ton. World stocks, according to the American Bureau of Metal Statistics on August 1 were estimated at only 37,200 tons. Current activities of consumers are at a very high rate, and there is a free outlet for the present scale of production. The market is firm at 7.80c New York and 7.45c East St. Louis.

TIN

Developments of the last month have furnished proof of the strong position of tin. Recent absorption of stocks has reduced visible supplies to small proportions. Total visible supply at the end of July stood at only 13,777 tons, against 19,857 tons a year ago. The decrease in July amounted to 2,054 tons. August statistics were not ready when this report was prepared, but they are expected to accentuate the strength of the statistical position. Consumers have been frequent buyers of nearby supplies. Early in the past month prompt Straits sold at 64⅛c., but shortly after this firm opening the market had a sudden outburst of strength which caused a sharp advance to 65⅛c. A little later the August position sold at 66¼c, but reaction followed quickly and the price broke to 64⅜c on weak London advices. The decline was temporary, however, and on August 30 the price of prompt Straits was up to 65¾c @ 66c.

LEAD

Despite restricted English consumption owing to the continuance of the coal strike and frequent price fluctuations in the foreign market, the course of the domestic market has been characterized by a steady undertone. August sales and shipments have enabled producers to round out a sustained record of good business. The price situation has been maintained by the leading producer at 8.90c New York basis for the past month. Domestic consumption is on a large scale and there is every indication of continued high rate of demand from consuming interests. Important new business is expected to develop in September, and recent improvement in the foreign market is likely to strengthen values here.

ALUMINUM

With continued heavy consumption of aluminum, market values give evidence of underlying strength. Domestic demand is making steady inroads on both home and imported supplies. A continuation of the present period of activity in the automobile industry is calling for regular shipments in large volume. A more extensive use of aluminum is in prospect by reason of new commercial demands for railroad equipment and other lines of industry. The volume of requirements are expected to increase during the balance of the year as trustworthy evidence seems to point to expanding consumption. Present quotations were steady at 27c @ 28c for 99 per cent plus virgin ingot and 27c for 98-99 per cent grade. Imports of aluminum, including manufactures of, for the first 7 months of this year amounted to 19,329 tons, against imports of 19,531 tons for the whole of 1925.

ANTIMONY

There was a radical loss of market strength in August owing to substantial arrivals and pressure of resale lots for sale. The effect on values was to depress prices to the 15 cent level duty paid. Sales of spot were reported at this figure and futures were freely offered at same price. Chinese regulars for September, October and November deliveries were quoted at 13 cents c. i. f. New York, 15c duty paid. Recent demand was quiet for all positions, but on present basis new buying interest is likely to develop any time. The Chinese situation continues unsettled, but the position in the Far East may soon display resistance to the downward trend. Shipments of regulus from China to the United States during June and July amounted to 1,200 tons.

QUICKSILVER

The market was moderately active lately and prices steady at $90 @ $90.50 per flask of 75 pounds. More activity is looked for during the next few weeks as trading in the chemical market broadeps.

PLATINUM

A somewhat firmer tone and fairly active demand was reported. The situation was more favorable for sellers, with refined platinum quoting $112 @ $113 an ounce.

SILVER

A further decline in silver during August gave the market a setback to 61⅝c an ounce. The break was due to the prospect that India would establish the rupee on a gold basis as per the plan of the Indian Currency Commission. Heavy sales were made on the theory that the commission's recommendations that the large silver reserves in India would be reduced and Indian consumption of the white metal become relatively smaller. The selling, however, was overdone and the market rallied due to short covering. Chinese operators were big buyers and for a time were strong supporting factors. Bullion prices, however, are again easier at the official quotation of 62¼c an ounce at this writing. India will undoubtedly be a large consumer of silver under the new plan as well as under the old. But this out-of-the-usual development has injected considerable uncertainty into the situation, and silver prices will be sensitive to the course of events in the Far East for some time.

OLD METALS

There is some increase in demand for copper scrap at higher prices due to the improved tone in the primary market. Heavy copper advanced to 12 cents, being an advance of ¼c over recent quotations. Consuming demand for copper bearing material is in good volume and most offerings find a ready market. Lead grades were not so active lately, but firmer London prices were reflected in the better local tone. Sales of aluminum are in fair volume and prices remain steady. Buying prices made by dealers quote 11¾c @ 12c for heavy copper, 9¾c for light copper, 7¼c @ 7½c for heavy brass, new brass clippings 9½c @ 9¾c, light brass 6¼c heavy lead 7½c @ 7¾c, new zinc scrap 5½c @ 5¾c battery lead 5½c @ 5¾c and aluminum clippings 21c @ 21½c.

WATERBURY AVERAGE

Lake Copper—Average for 1925, 14.427—January, 1926, 14.25c.—February, 14¾c.—March, 14.25c.—April, 14.125c.—May, 14.00c.—June, 14.00c.—July, 14.25c.—August, 14.50.

Brass Mill Zinc—Average for 1925, 8.263—January, 1926, 9.00c.—February, 8.20c.—March, 7.80c.—April, 7.45c.—May, 7.20c.—June, 7.55c.—July, 7.80c.—August, 7.80.

Daily Metal Prices for the Month of August, 1926

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	2	3	4	5	6	9	10	11	12	13	16	17	18
Copper (f. o. b. Ref.) c/lb. Duty Free													
Lake (Delivered)	14.625	14.625	14.625	14.60	14.50	14.50	14.60	14.60	14.50	14.50	14.60	14.60	14.60
Electrolytic	14.30	14.35	14.35	14.35	14.25	14.25	14.275	14.275	14.225	14.20	14.25	14.30	14.25
Casting	13.90	14.00	14.00	13.95	13.90	13.90	13.95	13.95	13.90	13.85	13.90	14.00	13.95
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.													
Prime Western	7.45	7.40	7.40	7.40	7.35	7.30	7.35	7.35	7.325	7.325	7.35	7.40	7.40
Brass Special	7.50	7.475	7.475	7.475	7.425	7.375	7.425	7.425	7.40	7.40	7.425	7.475	7.475
Tin (f. o. b., N. Y.) c/lb. Duty Free													
Straits	64.125	65.125	65.375	65.375	65.625	66.25	66.00	65.50	64.50	64.50	64.875	64.75	65.00
Pig 99%	63.375	64.25	64.625	64.50	64.625	65.00	64.625	64.25	63.25	63.125	63.375	63.25	63.50
Lead (f. o. b. St. L.) c/lb. Duty 2¼c/lb.	9.00	9.00	9.00	8.95	8.90	8.90	8.90	8.90	8.90	8.90	8.90	8.90	8.90
Aluminum c/lb. Duty 5c/lb.	28	28	28	28	28	28	28	28	28	28	28	28	28
Nickel c/lb. Duty 3c/lb.													
Ingot	35	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	39	39	39	39	39	39	39	39	39	39	39	39	39
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	16.00	16.00	16.00	16.00	16.25	16.75	16.75	16.75	16.50	16.50	16.00	16.00	16.00
Silver c/oz. Troy Duty Free	63.375	63.25	63.375	62.75	61.625	62.50	62.125	62.25	62.50	62.00	61.875	61.75	62.00
Platinum $/oz. Troy Duty Free	111	111	112	112	112	112	112	112	113	113	113	113	113

	19	20	23	24	25	26	27	30	31	High	Low	Aver.
Copper (f. o. b. Ref.) c/lb. Duty Free												
Lake (Delivered)	14.60	14.60	14.60	14.60	14.50	14.50	14.50	14.50	14.50	14.625	14.50	14.563
Electrolytic	14.25	14.25	14.25	14.25	14.25	14.20	14.20	14.25	14.30	14.35	14.20	14.265
Casting	13.95	13.95	13.95	13.95	13.95	13.90	13.90	13.95	13.95	14.00	13.85	13.936
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	7.45	7.45	7.45	7.425	7.375	7.40	7.45	7.45	7.45	7.45	7.30	7.395
Brass Special	7.525	7.55	7.55	7.50	7.475	7.50	7.50	7.50	7.50	7.55	7.375	7.470
Tin (f. o. b., N. Y.) c/lb. Duty Free												
Straits	65.625	65.25	65.25	65.125	65.25	65.25	65.625	66.00	65.875	66.25	64.125	65.284
Pig 99%	64.25	64.00	64.00	63.50	63.75	63.75	64.00	64.00	63.875	65.00	63.125	63.949
Lead (f. o. b. St. L.) c/lb. Duty 2¼c/lb.	8.80	8.80	8.80	8.75	8.70	8.65	8.65	8.65	8.65	9.00	8.65	8.841
Aluminum c/lb. Duty 5c/lb.	28	28	28	28	28	28	28	28	28	28	28	28
Nickel c/lb. Duty 3c/lb.												
Ingot	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	39	39	39	39	39	39	39	39	39	39	39	39
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	16.00	16.00	16.00	15.75	15.50	15.25	15.00	15.00	15.25	16.75	15.00	15.966
Silver c/oz. Troy Duty Free	61.875	61.875	62.50	62.875	62.625	62.75	63.00	62.50	62.25	63.375	61.625	62.438
Platinum $/oz. Troy Duty Free	113	113	113	113	113	113	113	113	113	113	111	112.545

Metal Prices, September 7, 1926

NEW METALS

Copper: Lake, 14.50. Electrolytic, 14.25. Casting, 13.90.
Zinc: Prime Western, 7.425. Brass Special, 7.475.
Tin: Straits, 67.25. Pig, 99%, 65.125.
Lead: 8.65. **Aluminum,** 28.00. **Antimony,** 16.00.
Nickel: Ingot, 35. Shot, 36. Elec., 39. Pellets, 40.
Quicksilver: flask, 75 lbs., $91.00. **Bismuth,** $2.70 to $2.75.
Cadmium, 60. **Cobalt,** 97%, $2.60. **Silver,** oz., Troy, 61.50.
Gold, oz., Troy, $20,67. **Platinum,** oz., Troy, $113.00.

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	10½to11¼
Brass Ingots, Red	11¾to12¾
Bronze Ingots	12 to13
Casting Aluminum Alloys	21 to24
Manganese Bronze Castings	24 to42
Manganese Bronze Ingots	13½to17
Manganese Bronze Forging	34 to42
Manganese Copper, 30%	25 to35
Monel Metal Shot	32
Monel Metal Blocks	32
Parsons Manganese Bronze Ingots	18¼to19¾
Phosphor Bronze	13½to15
Phosphor Copper, guaranteed 15%	18⅞to22½
Phosphor Copper, guaranteed 10%	18 to21½
Phosphor Tin, guaranteed 5%	70 to80
Phosphor Tin, no guarantee	67 to77
Silicon Copper, 10% ....according to quantity...	25 to35

OLD METALS

Buying Prices		Selling Prices
11¾to12¼	Heavy Cut Copper	13¼to13¾
11½to12	Copper Wire	13 to13¼
10¼to10¾	Light Copper	11½to11¾
9¼to 9½	Heavy Machine Composition	10¾to11
7¾to 8	Heavy Brass	9 to 9¼
6¾to 7	Light Brass	8 to 8¼
7¾to 8¼	No. 1 Yellow Brass Turnings	9½to10
8¾to 9¼	No. 1 Composition Turnings	10½to11
7½to 7¾	Heavy Lead	8¼to 8½
5 to 5¼	Zinc Scrap	6 to 6½
12 to13	Scrap Aluminum Turnings	15 to17
16½to18	Scrap Aluminum, cast alloyed	20 to21
22½to23	Scrap Aluminum, sheet (new)	24 to25½
38 to40	No. 1 Pewter	42 to44
12	Old Nickel Anodes	14
18	Old Nickel	20

Wrought Metals and Alloys

COPPER SHEET

Mill shipments (hot rolled)	22c. to 23c. net base
From stock	23c. to 24c. net base

BARE COPPER WIRE

16¼c. to 16⅞c. net base, in carload lots.

COPPER SEAMLESS TUBING

25c. to 26c. net base.

SOLDERING COPPERS

300 lbs. and over in one order	21½c. net base
100 lbs. to 200 lbs. in one order	22 c. net base

ZINC SHEET

Duty, sheet, 15%	Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount	11.75 net base
Casks, jobbers' price	13.00 net base
Open Casks, jobbers' price	13.50 to 13.75 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price	40c.
Aluminum coils, 24 ga., base price	36.70c.
Foreign	40c.

ROLLED NICKEL SHEET AND ROD

Net Base Prices

Cold Drawn Rods	58c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	50c.	Hot Rolled Sheet	52c.

BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c or over Pig Tin; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 17c. over; less than 25 lbs., 25c. over.

SILVER SHEET

Rolled sterling silver, 63½ to 65½c.

BRASS MATERIAL—MILL SHIPMENTS

In effect August 3, 1926
To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.19⅜	$0.20⅞	$0.22⅞
Wire	.19⅞	.21⅜	.23⅜
Rod	.17⅛	.21⅝	.23⅝
Brazed tubing	.27⅜	.....	.32⅝
Open seam tubing	.27⅜	.....	.32⅝
Angles and channels	.30⅜	.....	.35⅝

For less than 5,000 lbs. add 1c. per lb. to above prices.

BRASS SEAMLESS TUBING

24¼c. to 25¼c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	21⅜c. net base
Muntz or Yellow Metal Sheathing (14"x48")	19⅜c. net base
Muntz or Yellow Rectangular sheet other Sheathing	20⅜c. net base
Muntz or Yellow Metal Rod	17⅜c. net base

Above are for 100 lbs. or more in one order.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Sheet Metal			Wire and Rod		
10%	Quality	27¼c.	10%	Quality	30¼c.
15%	"	28¾c.	15%	"	34 c.
18%	"	30 c.	18%	"	37¼c.

MONEL METAL SHEET AND ROD

Hot Rolled Rods (base)	35	Hot Rolled Sheets (base)	42
Cold Drawn Rods (base)	43	Cold Rolled Sheets (base)	50

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 20c. over; less than 25 lbs., 25c. over. Prices f. o. b. mill.

Supply Prices, September 7, 1926

ANODES

Copper: Cast ..... 22c. per lb.
Rolled ..... 21⅝c. per lb.
Electrolytic ..... 19⅛c. per lb.
Brass: Cast ..... 21c. per lb.
Rolled ..... 21⅝c. per lb.
Zinc: Cast ..... 14c. per lb.

Nickel: 90-92% ..... 45c. per lb.
95-97% ..... 47c. per lb.
99% ..... 49c. per lb.
Silver: Rolled silver anodes .999 fine are quoted from 65¾c. to 67¾c. per Troy ounce, depending upon quantity purchased.

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10-12-14 & 16"	1" to 3"	$3.00/lb.	$2.75/lb.	$2.65/lb.
6-8 & over 16	1 to 3	3.10	2.85	2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 up to 6	¼ to 3	4.85	4.85	4.85
4 up to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

Grey Mexican Wheel deduct 10c per lb. from White Spanish prices.

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

12" 20 ply 64/68 Unbleached	$31.00
14" 20 ply 64/68 Unbleached	38.55–39.95
12" 20 ply 80/92 Unbleached	32.45
14" 20 ply 80/92 Unbleached	44.00
12" 20 ply 84/92 Unbleached	37.15–42.85
14" 20 ply 84/92 Unbleached	50.40–57.60
12" 20 ply 80/84 Unbleached	37.75–38.90
14" 20 ply 80/84 Unbleached	51.20–52.40

Sewed Pieced Buffs, per lb., bleached 65-75c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.12–.16
Acid—Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.18–.22½
Denatured, bbls.	gal.	.45
Alum—Lump, Barrels	lb.	.03¼
Powdered, Barrels	lb.	.042
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—Sulphate, tech. bbls	lb.	.03¾
Sulphocyanide	lb.	.65
Arsenic, white, kegs	lb.	.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Borax Crystals (Sodium Biborate), bbls	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls	lb.	.30
Copper—Acetate (Verdegris)	lb.	.37
Carbonate, bbls	lb.	.17
Cyanide (100 lb. kegs)	lb.	.50
Sulphate, bbls.	lb.	.05½
Cream of Tartar Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05–.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$14.00
Gum—Sandarac	lb.	.26
Shellac	lb.	.59–.61
Iron, Sulphate (Copperas), bbl	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13¼
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.21
Nickel—Carbonate dry, bbls	lb.	.29
Chloride, bbls.	lb.	.18–.21
Salts, single 300 lb. bbls	lb.	.10½
Salts, double 425 lb. bbls	lb.	.10
Paraffin	lb.	.05–.06
Phosphorus—Duty free, according to quantity		.35–.40
Potash, Caustic Electrolytic 88-92% broken, drums	lb.	.09¼
Potassium Bichromate, casks (crystals)	lb.	.08½
Carbonate, 96-98%	lb.	.07
Cyanide, 165 lb. cases, 94-96%	lb.	.52½–.57½
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.06
Silver Chloride, dry	oz.	.86
Cyanide	oz.	.66
Nitrate, 100 ounce lots	oz.	.44½
Soda Ash, 58%, bbls.	lb.	.02½
Sodium—Cyanide, 96 to 98%, 100 lbs	lb.	.20
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls	lb.	.04¼
Phosphate, tech., bbls	lb.	.03¼
Silicate (Water Glass), bbls	lb.	.02
Sulpho Cyanide	lb.	.45
Sulphur (Brimstone), bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.45½
Tripoli, Powdered	lb.	.03
Wax—Bees, white ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½–.06
Zinc, Carbonate, bbls	lb.	.11–.12
Chloride, casks	lb.	.07
Cyanide (100 lb. kegs)	lb.	.41
Sulphate, bbls.	lb.	.03½